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COVER PHOTO

Major General A. C. McAuliffe, 24th Infantry Division Commander (2nd Right) checks gas masks in Chemical Warfare Equipment Inspection of 3rd Engineer (C) Battalion on Kyushu. He was nominated this week by President Truman for key post as Chief of Chemical Corps. He is accompanied above by (left to right): Captain J. J. Rogers, Div. Chemical Officer and Sgt. 1st Class W. E. Newton.

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NEWS OF THE SERVICES

Retired

MAJ. GEN. ALDEN H. WAITT

Maj. Gen. Alden H. Wait retired as Chief of the Chemical Corps on September 20. Secretary of the Army Gordon Gray in restoring General Waitt to duty stated:

"I have studied the record carefully and I have talked at length with General Waitt. I have found no evidence of dishonesty or conduct justifying trial by court marital. I did find that during a period of 30 years General Wait served the Army honestly and faithfully and that he made major professional contributions toward the development of the Chemical Corps."

In testifying before the Senate Investigating Committee in regard to letters which resulted in General Waitt's suspension, Maj. Gen. Harry H. Vaughan, Military Aide to the President, stated: "I made the request of General Waitt after discussing it with the President that he furnish factual data about the officers who might appear on a promotion list. I have done that on occasions before. The President approves of that and General Waitt furnished this material * * * I asked him for an expression, a frank expression, a paragraph on each officer in the Corps that would be qualified or that might be considered by the committee and I told the President I was going to ask him for it and I showed it to him after I received it. I must have started the conversation in asking him to prepare this list."

* * *

The Johnson Poll

In a determined effort to find out some facts, Defense Secretary Louis Johnson conducted a poll—including himself—of the Defense Department's ultra high brass as to whether they'd (1) been aboard a carrier at sea; (2) ridden a Sherman tank, and (3) flown in a B-36. He found—

	Carrier	Tank	B-36
Secretary Johnson	No	No	No
Secretary Steve Early	Yes	Yes	No
General Bradley	No	Yes	No
General Collins	Yes	Yes	No
Admiral Denfield	Yes	No	No
General Vandenberg	No	No	No
Army Secretary Gray	No	Yes	No
Navy Secretary Matthews	Yes	*	*
Air Secretary Symington	No	No	No

*Probably No. Mathews was absent at time of survey.

As a result of the poll official junkets are being planned to orient the Department's top echelon, including Secretary Johnson.

* * *

MAJ. GEN. A. B. QUINTON, JR.
Director for Industrial Programs

Succeeding Maj. Gen. Sidney P. Spalding as Director for Industrial Programs of the Munitions Board is Maj. Gen. A. B. Quinton, Jr. General Quinton assumed his post on August 29, the date of General Spalding's retirement from the service.

Chief of Chemical Corps

MAJ. GEN. ANTHONY C. McAULIFFE

Nominated by President Truman to the Senate in mid-September for confirmation as Chief of the Chemical Corps, Maj. Gen. Anthony C. McAuliffe, commanding general of the 24th Infantry Division in Japan since March, '49, realized he had hardly completed unpacking his bags before he was ordered to return to Washington. In March he had completed a three year tour of duty in the Pentagon where he had served as Army Secretary to the Joint Research and Development Board as well as Deputy Director for Research and Development, Logistics Division, General Staff. According to the books containing the rules and regulations he was slated for a few years duty with troops overseas. However, his experience with the technical services of the Army focused him in the eyes of Harry Truman as the man to head the Chemical Corps. The Senate agreed and confirmed him on Sept. 29.

Following World War II—in which he became one of the Army's most widely publicized commanders—General McAuliffe, in January 1946, became Ground Forces Adviser to Vice Admiral W. H. P. Blandy, Commander of Joint Army-Navy Task Force One, for Operation Crossroads—the tests of the atomic bomb. General McAuliffe served at Bakini throughout the tests.

FIRST AND SECOND ARMY

First and Second Army Chemical Corps Reservists completed their summer encampment training on September 3 at Army Chemical Center, Maryland, as their part of the summer training program for ORC Chemical Units of Zone of Interior Armies.

One hundred and eighteen Reserve Officers and enlisted men trained during the encampments which began on August 7. Thirty-one officers and enlisted reservists from New York and New Jersey attended the First Army encampment held from August 14 to 28. Eighty-seven reservists of Second Army units from Delaware, Maryland, Pennsylvania, Ohio and Virginia, participated in these held from August 7 to 21 and from August 21 to September 3. Lt. Col. Frank A. Rohrs, ORC Instructor from New Jersey, commanded First Army units. Lt. Col. Philip W. Heuman, commanded the Second Army encampments.

Extensive training was conducted on the operation of the 4.2" chemical mortar. General military training occupied a minimum of time since this was largely completed at home stations. Smoke battalions received on-the-job training in administration, supply and operation and maintenance of the smoke generator. Second Army units received a special one-day radiological defense course conducted by personnel of the Chemical Corps School.

Operation of the encampments indicated that they had been well-planned in advance. Some of the reservists arrived with uniform shortages but these were made up by issues from Army Chemical Center supply. Post cooperation in the administrative, supply and processing phase was called excellent, although transportation is still a critical item. Personnel of Army Chemical Center, Chemical Corps School, and post troop units cooperated to help make the encampments a success.

Officers of First and Second Armies displayed great interest in the progress of training. Among these were: Colonel John R. Burns, Chemical Officer, Headquarters, First Army; Colonel Timothy J. Murphy, Chemical Officer, Headquarters, Second Army; Colonel Arthur L. Schreves, Commanding Officer, Maryland Military District; Lt. Col. Herbert C. Roberts, Assistant Chemical Officer, and Lt. Col. H. D. Tyson, Chemical Corps ORC Instructor, also of Second Army.

Among reserve units represented in the summer training program were the 458th, 460th, 467th, and 2130th Chemical Mortar Battalions, the 451st and 453rd Chemical Smoke Generator Battalions; the 355th Smoke Generator Company; the 318th, 323rd, 330th and 364th Chemical Maintenance Companies; the 130th, 312th, 319th and 348th Chemical Processing Companies; the 377th Chemical Depot Company; and other miscellaneous units such as the 2440th Chemical Base Training Depot, the 2401st Research and Development Training Group, detachments 1 and 4 of the Maryland State Assignment Group, the 454th Chemical Service Battalion, the 461st Composite Service Battalion, casual detachment of the 2124th Replacement Training Company, and the 348th Finance Disbursing Section.

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MOTIVATIONS THAT SHAPE PEACE AND WAR*

" . . . . . THE FIELDS OF ABC WARFARE ARE AS WIDE AND VARIED AS THOSE OF OUR ENGINEERS, SCIENTISTS AND INDUSTRY ITSELF. THEIR POTENTIALITIES, EVEN IN THE HANDS OF A SMALL NATION, ARE SUCH THAT POWERFUL NATIONS MAY WELL FEAR AND DREAD A SURPRISE ATTACK FROM A SLY, SMALL NATION."

By Dr. John J. Grebe

Rather than dwell upon the chemistry of chemical warfare, I prefer to discuss unofficially my opinion of the broad aspects of ABC warfare as it fits into the motives that control the nature of peace and war.

The A of the abbreviated designation represents the atomic or radiological agents usable in a great variety of ways. B, commonly called biological, covers the wide field of toxic substances used against any kind of living organism, including humans. The C of the ABC designates the more familiar chemical warfare, in which various chemical materials are used to affect soldiers, whole populations and mechanical equipment to help win a war.

These materials range from those which kill on contact, or with the first breath, to those which merely sicken or weaken individuals or, affect them psychologically. Also included in this category are those which might induce explosions and accidents, start fires, and, in general undermine an enemy's capacity to resist.

The fields of ABC warfare are as wide and varied as those of our engineers, scientists and industry itself. Their potentialities, even in the hands of a small nation, are such that powerful nations may well fear and dread a surprise attack from a sly, small nation. In the hands of a great power, with adequate time for preparation and advanced technology, the potentialities are awe-inspiring indeed. Whether we like to recognize it or not, our ABC capacity has grown in such proportions that a greatly augmented effort will be required under present experienced guidance to get this team to carry the load that would inevitably fall on it in time for war.

Is War Inevitable

The really important thing for us to consider in our limited time is our position in this field, and how readiness in this type of warfare, can aid in the prevention of hostitilities. Is war truly inevitable? Can we as engineers affect the cause of peace? Can we, by utilizing our technical ability, prevent the mobilization of the staggering potential of our manufacturing industries, this time for ever so much more efficient and direct methods of fighting than before?

I will give you my own personal answer right now and then devote the rest of the time supporting my contention. This may seem an anti-climatic approach, but, this way, I hope we can think, reason, and understand the situation from an unemotional, factual, and detached, point of view.

First of all, I think we may conclude that there is no earthly reason for an all-out war. The only thing that could possibly bring such a war would be the desire on the part of a relatively short lived, temporary, regime to perpetuate its power by capturing and enslaving additional industrial capacity. We can be thankful, however, that we are not dealing with a regime led by emotionally unstable individuals but, instead, one controlled by cunning and materialistic realists. Facts, even though screened and tempered by subordinates to avoid displeasing the bosses, cannot help but be seen and evaluated. That is a great consolation when we consider our unconcealable array of scientific manpower and our easily converted, ever-growing ABC production capacity. If we can avoid war in the next decade, we can conclude secondly that we should expect long range strength and prospects for peace. We are at the threshold of a new cycle of growth for the population of this and friendly nations all over the world. Those may be bold conclusions, but we should be able to arrive at them based on long range motives and trends.

The best foundation for this is that the current cold war has unified our population and made our philosophy more realistic. We know what we stand for; we know what we want; and we have become more and more practical about getting it. It is by simply giving more than we receive that we have, and will continue, to gain our end.

*An address presented by Dr. Grebe to the Chemical Engineers Club of Washington. Dr. Grebes serves as an advisor to the Chief, Chemical Corps.

Warfare has always been characterized by, and followed the pattern of industrial potential. The growth of the Army Chemical Corps during the past decade has paralleled but lagged behind the new growth of our industry. Now the need of catching up is unquestioned. In our time, it is the chemical and broadly the process industry that has grown the fastest all over the world, with recognized leadership in our hands. It has become the most powerful segment of our industry. Happily it is the one industry that has also led in developing self sufficiency, making each nation less dependent on imports from possible enemies. Thus, it is a most important instrument for peace as well as a powerful deterrant against war. In fact, part of the reason why chemical warfare has been submerged for so long, is the realization that the potentialities in this direction for fighting an efficient, antipersonnel war is so great that the military, as well as the civilians, naturally revolted against its use.

Protection Against ABC

Now, however, when total war has already been thrust on the world once, we cannot expect to be protected against ABC warfare by a fuehrer who, because we gassed him once in World War I, hated chemical warfare and feared our potential in it enough to keep it from being started.

We are now dealing with the kind of industrial production which forms a war potential; that is a sword and a plowshare at the same time.

Chemical industry makes all parts of the world more self-sufficient industrially and agriculturally. Today's world wide capacity of this industry is sufficient to support the basic concepts of unfettered growth without resorting to war. All of us know axiomatically that nothing we try to do can stop natural growth; i.e., an industry that is growing more rapidly than ever cannot help but have a long period of expansion ahead.

There is no apparent reason for a war to involve us based on population pressure, economic stagnation, or unavailability of raw materials.

Both sides of the current cold war are in a position to grow and expand within their current trade areas to almost any extent they desire. While the growth of population in Russia to about three times its present strength is inevitable based on its present growth curve, our rate of growth is also unlimited by physical reasons. Chemical and agricultural science have made possible several fold increase in productivity of our old depleted soils. Cheap earth-moving techniques have made soil conservation and irrigation more practical than ever. Industrial conversion of carbohydrates, inorganic nitrogen, phosphorus, and other minerals, into proteins is now commercially practical. Mechanical power is becoming cheaper all the time, the mighty atom still promises to drive our future machines.

There is hope even for the difficult case of Japan, where the population has jumped from 40 to 60 million in recent years, and where the rate of growth due to increased births and longer life expectancy swings sharply upward (thanks to American sanitation and medicine). Even there the problems of supplying the demand for food can and will be solved by modern process engineering methods. It is the chemical engineering profession that will help us most with these grave problems.

Population Trends vs. War

I think, by using the studies presented by Thomas Midgeley, one of our great pioneers in the chemical industry, in a talk to the American Chemical Society at Toledo in 1935, I can give a most interesting explanation of over-all population trends and their relation to history that brings them about. By so doing, I hope to show we should not fear war at present, and that indications are that we are growing such as to be morally and physically strong enough to prevent it in the future.

Midgeley outlined the growth curve and its substituent components. He pointed out that the initial impetus, in any new country, or, for any new era in an old country is due to a moral and spiritual renaissance guided by inspired leaders. By establishing new standards of human relations and a higher standard of honesty, it is possible for the population in the area to grow and to expand their industries. Instead of having to spend so much time policing and selfishly garnering, the people get along together on a basis of mutual forebearance and understanding and through their desire to help one another. This makes it possible for the gifted people to devote their newly won leisure to the development of the arts and sciences.

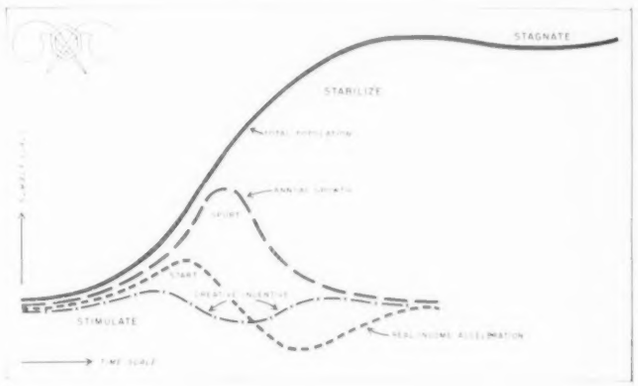
The 2nd period, during which the arts and sciences flourish, is identified by its great poets, artists, architects, and civil engineering progress. This phase is typified by a strong-man government, sometimes called empire builders by their contemporaries, or robber barons by their enemies. It is the beginning of a more democratic form of government that might be called a plutocracy. During the 3rd period, however, government is spread around over a wider base with more people educated and interested in expressing their will. It is also noted for its industrial geniuses and a materialistic outlook on life in general. The fruit of this period is a tremendously increased production capacity. This increased productivity per man makes possible a considerable excess of production over consumption, which goes into capital goods for further growth.

This is the period during which the population grows the fastest—the midpoint—the point of inflection on the growth curve. In general, Midgeley explained, it is also the period when materialism is at its height. Morals and spiritual values decline. Even honesty becomes a matter of expedience. International jealousies make necessary an ever greater dependence on military readiness to protect the country from outside interferences.

Fortunately for us, if we credit Thomas Midgeley's observations on the trend in governmental makeup throughout the various stages of growth of a country, one can agree with Winston Churchill that the natural

FIGURE 1

Is the United States soon to enter a period of stagnation? The recent accelleration of our annual growth, brought on by the appearance of new creative incentive, means a larger total population. However, in the normal national pattern, this growth has usually been followed by a period of stagnation or even decline.



death of strong men can lead to the succession of a more democratic regime not to be feared as an aggressor with the aim of self perpetuation.

The 4th period again increases the popular interest and control of government and it tends to go in the direction of a paternalistic bureaucy. The heroes of the day are not the philosophers, artists, poets, the engineers, or their production men, but the military. This 4th phase may be accompanied by severe military defeats, civil war, or just general decay and anarchy.

Finally, there is a long period of foundering around with internal dissension and external disdain during which no one can count on anything and human relations disintegrate still further.

The United States is well past the midpoint of its growth curve; in fact, we have arrived at about three-fourths the population to be expected on the basis of the more than 100 year old growth curve. The potentialities of Africa and South America are just now beginning to be tapped. It is merely a question of a sufficiently high standard of human relations being introduced into the latter areas and their possibilities will be unlimited.

In this equatorial realm the recent work on tropical diseases by American and British medical men, particularly the Army Medical Center, Walter Reed Hospital, may well prove to be more important than all the world's research on nuclear energy. Now it is possible at least to populate most of the tropics under healthy living conditions. This, combined with lower cost transportation and air conditioning, will eventually make it possible for the entire industrial potential of the world to be shifted closer to the equator, where basic food, clothing and shelter represent a much smaller fraction of the total requirements for happy living.

This overall view of the possibilities for human growth and expansion should dispel from our minds any fear that the United States might be involved in another war due to any real or imagined population or economic pressure on the part of any potential enemy or because we are in our decline and will be easy picking. Quite the reverse is true.

All of you know that our recent population growth curve shows a new spurt. This increase in population has resulted out of the greater emphasis on human values during and immediately after the war. The trend during the 30's which indicated a downward change in the ultimately expected population of the country, has been overcome and we are currently exceeding the expectations based on the old growth curve that we have been following for more than 100 years. The new estimates have raised the predicted population limit by at least 20 million. The increase in real income per person which furnishes the incentive for this acceleration had been established before the effect was noted on the population.

What is more, this unprecedented spurt is coming in spite of a decrease in the birth rate among those people who are more interested in material values and a false financial security than they are in the happiness of a larger family. Combining this with a decrease in the births of otherwise unwanted children, one can hope for a very healthy, sound, self-purging growth of a new and happier population. The increased span of life provided through medical science will give many more children the

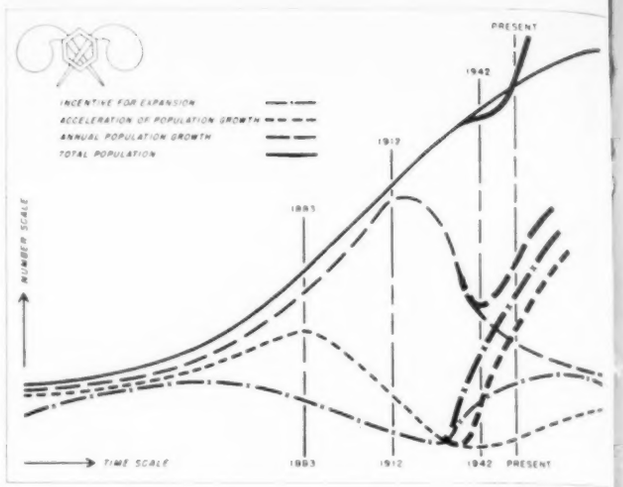


FIGURE 2

Post-depression incentive, followed by World War II, have caused U. S. population growth to deviate sharply from normal trends followed for over a hundred years. The author feels that the new trends (indicated by heavy lines) may well be the beginning of a new growth curve which has already raised predictions of our future population total by 20 million.

benefit of grandparents. This will also help to increase the basic moral qualities of a nation.

We have no need, nor have we any urge, to harm anyone outside our borders. On the contrary, we wish to share with the rest of the world our industrial and scientific "know-how" as defined by the fourth point in President Truman's International Recovery Program. There is very little that we could possibly gain in return except the privilege of being left alone to expand and grow in our own country.

In fact, the average American is proud of the self-imposed austerity that has made and will continue to make this foreign help possible. This is also very true of England, where long before there was any cold war, the nation had embarked on a program of sharing its very limited food supply for the purpose of helping war-torn populations.

What better evidence could we give of this than by the use of the air lift for the benefit of the many friends and relatives behind the Iron Curtain that have been cut off from the "CARE" packages and the like recently. Similar help for others still beyond our reach may yet be worked out.

This should show us we have no decay to fear for some time. Instead there is reason to believe that we have started on a brand new growth curve with an as yet indeterminate goal ahead.

Factors For Consideration

All the factors required for such an increase are at hand.

1. There is a moral and spiritual regeneration taking place.

2. There is a new standard of social and international responsibility.

3. There is a new appreciation of the old truth that anything that builds up our country is for the good of all even though it may first show up on some one person's profit ledger.

4. There is a new appreciation of *that* liberty and dignity of the individual that has made this country the most envied in the world.

5. There is a new affirmation on the part of the military, and the Commander in Chief, who affected such complete demobilization after the war, that they do not want to dominate in any field outside of their immediate responsibility.

6. There is a new living proof of the desire of our people to be left alone to work out their own problems and to let others live their own lives.

7. There is a new understanding that social benefits cannot be created by legislative acts or by striking, they require work and increasing productivity.

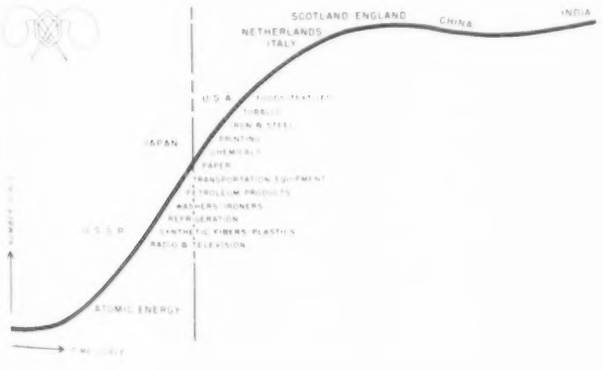
Nevertheless, there is the warning in these growth curves that tells us that unless we do continue our growth of internal potential definitely above that of our past trends, we can look forward to a time not too far hence when, as compared to others, we will be a small, weak, relatively backward nation where people are more concerned about the homes and other capital goods that they will inherit or fanagle rather than the new ones that they can build. The 500 million population of the Eastern block could look on us, at that time, with pity much like we now regard France or Spain.

Should War Come

So far, I have told you what the ABC concept is, and how well our industrial potential fits into it. We have discussed the historical probabilities of our having another war in the near and distant future. Now, I would like to point out what would be most likely to happen in the event war should start. It could happen, even though neither we, nor the population of an enemy country, want it. Certain ruthless individuals might try to impose the shackles of a regimented economy and slave labor on us to perpetuate their rule. What type of warfare should we expect? What asset of ours would have to be eliminated before we could be enslaved? Obviously, it would seem that such an enemy would not want to destroy the facilities he wants for himself. He would rather eliminate the people who do not go along with his philosophy of collectivism and autocratic government. This can best be done by using the newest developments that have come out of the last war and that gave the Nazis hope of ultimate success up to the last minute—rockets and pulse jet guided missiles. These can cover widely populated areas with anti-personnel agents that kill like no weapon has ever killed before. Some people have claimed that the potentialities of such agents even exceed that of the atomic bomb, and, of course, their cost is low.

FIGURE 3

By applying the normal growth curve to nations and products, the author finds the U. S. nearing a population peak, with Russia entering a period of tremendous growth. Radio and television start a new upswing, while Chemical production continues its recent multi-billion dollar program of expansion.



In other words, indications are that the "ABC" type of warfare, whether delivered by ground, naval or air forces, can accomplish this conceivable purpose better than anything else, and, therefore, I personally believe, *it would be used.*

Similarly, our purpose of breaking the ability to fight off a regime that is capable of destroying our whole philosophy and incentive for living, centers itself around manpower. We could conceivably make it impossible for an enemy to use his manpower against us, while maintaining at the same time the possibility of reestablishing a healthy industrial economy among the liberated people behind the present Iron Curtain. This again can best be accomplished by those "ABC" warefare techniques which temporarily weaken enemy people and deny facilities for military production without killing unnecessarily, or destroying installations.

Process Industries Indispensable

So, either way we look at it, both from the point of view of immediate blows on military power or from the point of view of the long range objectives the established potentalities of our process industries for "ABC" warfare are indispensable. Just as in the period between the Spanish American War and World War I naval power, obviously in need of tremendous support, didn't get it until dire necessity forced the issue, during World War I; just as between World War I and World War II, the potentialities of aerial warfare were obvious but neglected until almost too late during World War II; so, at the present time, the potentialities of chemical warfare are obvious and its development is most urgent.

Happy to say, all three departments of our armed forces have been, for years, integrated in a remarkable way as far as the chemical warfare activities are concerned. What is more, the combined resources, meager as they were, made us so strong in this field during World War II that none of our enemies dared to attack us in this way. The chemical mortar, the remarkably improved incendiaries, and the broad application of new smokes and screens during the last war have made lasting friends in all the services. The new developments, now brewing, will require the same sort of patient and persistent nursing to take advantage of our new possibilities. Even now, ABC warfare, while still in its infancy, is getting a wholesome batting around and support in various lines by all three departments of the National Military Establishment.

It is interesting to note that the growth of the industrial potential of our nation has been exactly in the direction of producing the basic chemicals in the kind of equipment that can be readily converted into what it takes to stop the advance of a powerful land thrust with modern mechanized techniques. Just think, according to the February issue of "Chemical Engineering," 10 billions of dollars are to be spent by the process industries in the next four years and more than 2 billions this year. This after just finishing the biggest expansion program ever, in any industry. What is more, these industries are in a most favored position for sustaining this expansion. The growth of war potential that this efficiently planned

peacetime expansion represents is a much more than the same expenditures made too late and hurriedly under wartime conditions.

Similarly, no military school in any country could possibly duplicate the value of the 3600 graduates in chemistry and chemical engineering from our colleges this past year. The ever increasing number of these men fed into industries cause them to expand at an impressive rate. These men have brought the production of 16 of the major chemical companies up by a factor of four over the past ten years, and there is no limit in sight as yet.

While the parallel progress in chemical warfare research is good, we must recognize that the difference between the present state of the art and the goals to be achieved are greater in this field than in any other military activity. Order of magnitude improvements are possible. We are handicapped by the fact that many of our agents and material are untried in any recent war activities. We have to depend upon imagination, extrapolation and inferences, based on detailed analysis of meager factual data. There is nothing remotely resembling the test operations such as were carried out at Bikini and Eniwetok. Certainly *those* tests were most valuable and timely.

It was because of the realization of the need for increased emphasis in this line that I was willing to disrupt the family for a term of duty. We disregarded the warnings of many good friends that effective work is impossible under our governmental set-ups. We gave it a try. Now I am happy to report that the experiment has been most satisfactory. The scientific climate has been conducive to the kind of work that was necessary—thanks to General Waitt and Colonel Creasy.

My problem has not been to find projects that are possible and permissible, but, instead, how to sift out of the many potentialities those items that are most urgent, for immediate, intensive, application. I can assure you that only a fraction of the total has been touched. On these, progress is being made as rapidly as possible. However, the broad development and application of our capacities to the needs of the Department of Defense will require the viewpoint and background of many experienced research directors of the various chemical and process industries. There is nothing that I can recommend more highly than that a succession of men will be willing to cut into their professional career for these purposes. It should be a requirement that you men who have had success in building up new products, new industries, thousands of new jobs, and new services to the public, should be required to do the same for the National Defense Agencies. There is no place where the best of our new graduates can work with more satisfaction and responsibility for doing important things, than with the organization that has been able to do so much with so little in the past.

I can assure you that if the top men in industry were to realize the pressure and urgency with which our military men are treating these problems, the hours they work, the drive they put behind their effort to get things done, we would realize that we owe more than we can ever repay to these men. They are trying to keep us from lagging behind in this most important new war potential. Our own geni, our own professional achievements, may well strike at us and wipe us out—literally, if we do not make it evident by our personal interest and actions that we are backing the Army Chemical Corps in its strenuous effort to keep us prepared. The time for this is right now. Later, when the government of our possible enemy has achieved the inevitable broader base, the hazard of war should, in my opinion, be over.

NOTHING NEW DEPARTMENT

FLAME THROWER DIVISION

In spite of its outstanding success in World War II, the flame thrower was subjected to much criticism because of its comparatively short range. As a result, much thought has been given to the possibility of improving this range by the use of "packaged" fuels, incendiary bazooka shells, and the like.

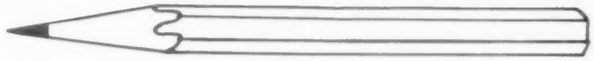
The fact that this line of thinking is sound has now been definitely proved without the necessity of resorting to expensive Service tests. This proof has been uncovered in a report on foreign materiel. This report, which was not acquired through the usual intelligence channels, somewhat pre-dates Chemical Corps activities in this field. Specifically, the Scientific American of August, 1849 contained the details:

"One of the military innovations that has marked the war in Hungary is the Austrian fire rocket. These rockets have been ably directed not only against towns, but against bodies of troops. They have . . . been used, both in the Austrian and Hungarian armies. (The) rockets (are) carried by corps on foot bombardiers able to march with the infantry. Each man carries a rest framed of wood on which the rocket is placed and directed. It has been stated that these Congreves, employed in a battle, ranged by the Austrian bombardiers who have practised them for many years, have produced a tremendous effect, particularly upon the Hungarian cavalry. They are tubes of wrought iron brought to a point, pierced with holes, and filled with incendiary matter, and are so charged as to emit above them, at the end of their flight, small streams of liquid fire."

As the over-age-in-grade Artillery Officer exclaimed on recognizing amazing similarities between the latest model guns issued to his organization and those which were discarded as obsolete during his initial service as a second lieutenant, "We don't progress, we just revolve."

FRED B. SHAW, JR.

CHEMICAL CORPS EXTENSION COURSES



ALL EXTENSION COURSES WITHIN THE SERIES PRESCRIBED CARRY BOTH TRAINING AND RESERVE RETIREMENT CREDIT. ONE TRAINING CREDIT IS GIVEN FOR ONE HOUR STUDY WHILE THREE HOURS OF STUDY BRING ONE POINT FOR RETIREMENT.

As the ORC enters its new training year, many reservists are wondering if June 30, 1950, will find them with the 50 points required for a satisfactory year of active reserve duty. Some have already found points difficult to accrue due to business and personal matters occasionally interferring with their attendance at regular meetings and camps.

As a result, more and more Reserve Officers are turning to the extension courses offered by the various Service Schools, both to improve their professional stature, and to assure themselves sufficient credit points in the event of unavoidable interruptions in their reserve training program.

While extension course study can in no way replace the training offered by the reserve units and camps, they do provide a very valuable supplement paralleling the local training activities.

Of the Chemical Corps courses described in D/A Pamphlet No. 20-100, only those listed below are available as of June 1, 1949. The courses in 20-100 not appearing below are now being revised, and Unit Instructors are kept informed of all additions to the list of courses available.

In addition to those shown here, a series of extension courses on Radiological Defense is being prepared and will be announced as soon as possible.

To obtain a constructive credit evaluation based on past training and experience, a reservist need only apply to his Unit Instructor, who in turn is authorized to request evaluation directly from the School. Having evaluated the Officer's training to date, the School will prescribe a course of study for each individual. After that, the reservist cannot select the series or sequence of his correspondence studies. However, specific courses in a lower numbered series than that prescribed may be requested, and full credit toward retirement will be allowed upon their successful completion.

All extension courses within the series prescribed by the School carry both training and reserve retirement credit. One training credit is given for approximately one hour of study, while approximately three hours of study bring one point of active reserve (retirement) credit.

Each extension course must be completed before June 30 to have such credit applied to that training year. Surplus points above the required 50 cannot be carried over and applied to the next training year.

CHEMICAL CORPS EXTENSION COURSES AVAILABLE

Number	Name of Sub-Course	Training Credits	Reserve Retirement Points
10-3	Leadership, Discipline, Courtesy, and Customs of Service	8	2 2/3
10-4	Military Sanitation	15	5
10-5	First Aid	12	4
10-6	Military Law-The Law of Military Offenses	20	6 2/3
10-7	Drill and Physical Training	12	4
10-8	Map and Aerial Photography Reading I	20	6 2/3
10-9	Interior Guard Duty	10	3 1/3
10-10	Individual Clothing and Equipment	10	3 1/3
10-11	Individual Weapons	24	8
10-12	Camouflage and Concealment	12	4
10-13	Administration I	19	6 2/3
10-14	Individual and Local Security	15	5
10-15	Scouting and Patrolling	14	4 2/3
10-16	Combat Intelligence I	10	3 1/3
10-17	Estimate of the Situation and Combat Orders I	14	4 2/3
10-18	Security Against Chemical Attack	16	5 1/3
20-1	Chemical Agents	18	6
20-2	Chemical Materiel	18	6
20-3	Methods of Instruction	14	4 2/3
20-4	Unit Supply	18	6
20-5	Mess Management	18	6
20-7	Materiel—4.2" Chemical Mortar	8	2 2/3
20-8	Motor Vehicle Operation and Maintenance	20	6 2/3
20-9	Meteorology and Cloud Travel I	15	5
20-11	Combat Intelligence II	16	5 1/3
20-13	Materiel—Flame Thrower and Flame Thrower Fuels	12	4
20-17	M-2 Mechanical Smoke Generator	11	3 2/3
20-18	Tactical Employment of Chemicals (War Gases)	16	5 1/3
30-5	Estimate of the Situation and Combat Orders II	18	6
30-4	Chemical Mortar Company	21	7
30-5	Chemical Corps Service Units	21	7
30-8	Meteorology and Cloud Travel II	8	2 2/3
30-9	Reconnaissance and Security	12	4
30-11	Materiel—Disposition of Chemical Corps Items	20	6 2/3
30-12	Rifle Company in Attack	22	7 1/3
30-22	Military Boards and Investigations	18	6
30-25	Signal Communications for all Arms and Services	20	6 2/3
40-3	Staff Organization and Duties of Chemical Officers I	14	4 2/3
40-4	Rules of Land Warfare	16	5 1/3
40-5	Military Government	15	5
40-6	Chemical Mortar Battalion I	15	5
40-9	Counterfire Organization and Techniques	16	5 1/3
40-11	Field Artillery in Support of Infantry	10	3 1/3
40-15	Infantry Battalion in Attack	24	8
50-22	Tactical Principles and Control Methods	15	5
50-39	Organization of the Theater of War Personnel	30	10
50-42b	Sources of Information	20	6 2/3
50-44a	Supply (Division and Corps)	22	7 1/3
50-52a	Army and Army Group Intelligence	15	5
50-53a	Operations Procedures	30	10
50-54a	Supply (Army and Higher)	22	7 1/3
50-54b	Transportation and Movements	20	6 2/3
60-1	Leadership, Psychology and Morale	15	5
60-2	Tactical Principles and Decisions I	15	5
60-3	Tactical Principles and Decisions II	30	10
60-4	Tactical Principles and Decisions III	30	10
60-5	Tactical Principles and Decisions IV	30	10
60-21	The Army Areas	20	6 2/3
60-22	The Advance Section	20	6 2/3
60-23	The Base Section	20	6 2/3
60-24	The Communications Zone	20	6 2/3

LATIN AMERICAN STUDENT *Exchange Program*

"..... IN WAYS UNFORSEEN AT THE TIME OF THE PROGRAM'S ORIGIN, THE EXCHANGES BETWEEN THE UNITED STATES AND LATIN AMERICAN COUNTRIES ARE PAYING DIVIDENDS NOT ONLY TO THE COUNTRIES DIRECTLY CONCERNED BUT TO THE ADVANCEMENT OF HUMAN RESOURCES FROM WHICH PEOPLE OF MANY LANDS WILL PROFIT."

By Jacob K. Javits*
U.S. Congressman from New York

The United States Government is now conducting two student exchange programs in the western hemisphere authorized by the 76th Congress.

These programs originated as part of the Good Neighbor Policy and have turned out to be a highly successful experience in promoting hemispheric solidarity, good will and mutual understanding, both among nations and among peoples. The results of these programs have proven conclusively that first-hand contact with other peoples produces the types of international friendships needed as the foundation for lasting peace.

From 1940 through June, 1948, 1448 students from the other American republics have been assisted to come to the United States for study, 63 American students have so far been given opportunities for graduate study in the southern republics, but the war restricted the southward flow of American students.

Students coming from the other American republics study subjects from anthropology to veterinary medicine. In 1948, for example, of the 129 students from 19 of the other American republics who received grants-in-aid under the travel and maintenance program; thirteen studied agriculture, 5 sociology, 11 education, 7 engineering, 24 medicine, 10 science, 10 humanities. They studied in 29 states, at more than 60 different colleges and universities. During the same year, the 18 United States students who received grants for graduate study in the other American republics came from 13 states, went to such countries as Argentina, Brazil, Chile, Columbia, Costa Rica, Haiti, Mexico and Peru, and studied in fields as varied as botany, geography, literature, political science, and history.

To illustrate the kind of awards that are made, it may be of interest to cite four examples of students who received different types of assistance under this year's program.

Enrique Gremler and Juan Enrique Phillips, both of Valparaiso, Chile, received tuition fellowships from The New York State School of Forestry at Syracuse University, Syracuse, New York, for study of wood chemistry and plastics. Both of these students received United States Government maintenance grants of $105 per month for nine months.

Jaime Uribe of Colombia received United States Government travel and maintenance grants in connection with a tuition fellowship awarded him by the University of Illinois for the study of chemistry. Mr. Uribe's home is in Bogota, and he expects to teach in the National University upon his return.

Victor Miguel Granada, of Asuncion, Paraguay, received a United States Government maintenance grant for the study of wood chemistry and pulp and paper technology at the University of Idaho, which awarded him free tuition. Mr. Granada also received a maintenance grant in the 1948 fiscal year, as well as a partial travel grant from the United States government and a Pan American World Airways grant. His grants were renewed on the basis of his excellent record at the University of Idaho.

Funds for the two programs of student exchange with the other American republics—grants for travel and grants for maintenance—are made available under the State Department's appropriation and are then transferred to the United States Office of Education. The latter is assisted in its administration of the travel and maintenance grant program for foreign students through a grant-in-aid made by the Office of Education to the Institute of International Education each year.

Inter-American Cultural Relations

The first United States Government assistance made available to foreign students was under the terms of an inter-American agreement signed at a meeting of foreign ministers of the 21 American republics at Buenos Aires in 1936. The Convention for the Promotion of Inter-American Cultural Relations, as this agreement is called, has been ratified, in addition to the United States, by sixteen American republics.

The Convention provides for the annual exchange of two graduate students between each of the signatory governments. Under the terms of the agreement the nominating country or the student pays travel expenses while the receiving country pays for tuition, incidentals and maintenance. In the United States the maintenance allowance is $135.00 per month and the allowance for books and incidentals is $150.00 per year.

The students under the Convention who are selected from panels of five submitted by each participating country, are required to have a knowledge of the language of the country to which they are going and must have completed their college courses.

This program is administered by the United States Office of Education in cooperation with the State Department.

Student exchanges under this Convention began in the academic year 1939-1940. In December 1942, the appointment of United States students was suspended because of the

*Congressman Javits wishes it to be noted that this article was prepared in cooperation with the Division of Exchange of Persons of the Department of State.

war. From the beginning of the program through the fiscal year 1948, awards were granted to thirty students from the United States and 186 students from the other American republics.

Travel and Maintenance

Since 1941 Congress has approved annually under the over-all program of cooperation with the other American republics a modest sum for travel and for maintenance grants to selected students from the other American republics and the United States.

Beginning with the 1948 fiscal year (July 1, 1947-June 30, 1948), the administration of the Government's student exchange program was transferred from the State Department to the United States Office of Education, assisted by the Institute of International Education.

The selection of candidates from the other American republics for grants is based on the following considerations: (1) such awards must supplement fellowships, scholarships, internships or other forms of aid granted by colleges, universities, research organizations or other institutions in this country; (2) the grants are made only to students who otherwise would be financially unable to accept the awards offered them by institutions of higher learning in this country; (3) students selected for grants are those whose field of interest, characters, and general backgrounds are such as to indicate that the academic training they will receive in the United States will later prove useful in the scientific, educational, technical and artistic development of their respective countries and at the same time promote understanding and friendship between the United States and the other American republics; (4) every effort is made to distribute the students from the other American republics widely in the United States and to assure fair representation from all of the other American republics.

Under the travel-maintenance grant program the amount awarded to any student is based upon the amount which the student himself is able to furnish. The maximum maintenance allowance for a student from the other American republics is $135.00 per month for a period not to exceed twelve months, but students who maintain excellent records are eligible for renewal of their maintenance grants for a second year. Travel and maintenance grants are awarded only to those who have finished their undergraduate work in their home universities, normal colleges, or other institutions of higher learning, with the exception of certain undergraduate students from the other American republics who may be unable to obtain university training in their fields in their home countries or a nearby country. Such a student may occasionally be considered as a special student, and as such, eligible for Government aid, if he has shown sufficient seriousness of purpose, perhaps by obtaining several years' practical experience in his particular field.

Mr. Stanley Linn Robe, at right, a graduate student at the University of North Carolina, recording the dialect of a resident of San Bartolo, Jalisco, Mexico. Under the student exchange program sponsored by the Interdepartmental Committee on Scientific and Cultural Cooperation, Mr. Robe visited Mexico under a grant from the Department of State. He spent several months studying the dialect of the Los Altos region of the State of Jalisco.

On the basis of applications received by the Institute of International Education from the other American republics, recommendations for grants are made by the Institute to the United States Office of Education. To facilitate the procedure for making application for fellowships or scholarships in the United States, Fellowship and Scholarship Selection Committees have been set up in each of the other American republics. On the basis of applications received by local committees, the credentials of the most outstanding candidates are then forwarded to the Institute of International Education which in turn evaluates them and submits them to various institutions of higher learning in this country. The latter select the students to whom they wish to award fellowships or scholarships. From 1941 through June, 1948, a total of 1391 students from the other American republics received aid under this program.

The travel and maintenance grant program to assist United States graduate students to undertake academic studies or research in the other American republics, suspended during the war, was resumed in 1945. These grants are awarded to qualified candidates to supplement personal funds or funds received through fellowships or other assistance from universities, research councils, or other qualified organizations. Projects to be undertaken by students are considered with reference to their usefulness in the development of broader understanding between the United States and other American republics as well as on the basis of their technical merit, and are normally sponsored by appropriate university or college authorities.

Candidates must hold a bachelor's degree or its equivalent and must be engaged in or have recently completed graduate study. They must also have a good working knowledge of the language of the country in which study is to be undertaken. In granting awards, preference is given to honorably discharged veterans of World War II who meet all other qualifications.

Grants to United States students provide travel or maintenance, or both, in accordance with the individual needs of the students and estimates of the cost of living in the countries where they are going. The maximum maintenance allowance for a student in one of the other American republics is $150.00 per month for a minimum of six months, and a maximum of one year. Under exceptional circumstances grants may be renewed, provided funds are available. From 1941 through June 1948, a total of 63 American students have received aid under this program.

Close cooperation exists between the State Department, the Office of Education and the Institute or International Education. The Institute has operated as the principal agency in the United States in facilitating educational exchange between the United States and the other nations. The Institute draws on experience gained over many years in encouraging colleges and universities to offer assistance to properly qualified stu-

Miss May Robbins, of the Miami Orientation and Service Center, greeting engineering students from MacKenzie College, Sao Paulo, Brazil, upon arrival at the airport July 1, 1949.

dents and a knowledge of the fellowships and scholarships already in existence for foreign students. The success of the Institute in interesting non-academic institutions in offering support has not only made the program of the Federal Government truly cooperative and supplementary, but has also made it possible to use governmental funds for a greater number of students.

A grant-in-aid from the Office of Education to the Institute enables it to assume the administrative operations of the Government's program and also provides an emergency fund for certain foreign students who may have immediate and unexpected need for such assistance.

The State Department has received considerable evidence of the effectiveness of the exchange programs in increasing understanding between other American republics and the United States. A report entitled "My Two-Year Stay in the United States" has recently been received from Misael Acosta Solis, an Ecuadoran student who received Government travel and maintenance grants for the study of forestry at the University of Michigan. He furnished in his report not only a record of his own accomplishments in the United States, but also his observations on the foreign student in general, the educational system in the United States, and suggestions concerning the student exchange program. In the section of the report dealing with foreign students, Mr. Acosta Solis stated:

"But it is a fact that every Latin-American student who returns to his homeland boasts about the good things he saw in the United States; he becomes a 'number one' propagandist of the better things which should be imitated. Besides, the student who has ever been in the United States becomes an Ambassador of Good Will, working for the better understanding of each country."

Oscar Barahona Streber of Costa Rica came to the United States to study our civil service laws and social legislation. He had already compiled Costa Rica's code of labor and human rights, and was an advisor on labor matters to the government. The State Department awarded Mr. Barahona a six month field study grant in 1945 to enable him to continue his research here and visit persons in a position to be of assistance to him in advancing these studies.

Partly as a result of his work in the U. S., he was recalled to Costa Rica to draw up his civil service law. As a further result of his studies, he was later called upon by the Government of Guatemala to assist in drawing up social legislation of great importance to that country, and in establishing the Institute Guatemalteco de Seguridad Social, of which he is President. In June, 1948, The Guatemalan Government presented to Mr. Barahona the "Orden del Quetzel" in recognition of his services to their country.

In writing of his studies in the United States, Mr. Barahona makes the following remarks about the general value of his stay in the U. S.:

"While studying here I have learned to speak and write fairly the English language; I have been making lots of friends and personal acquaintances, who enable me to know exactly which are your ways of thinking and your social realities; I am nowadays familiar and extremely fond of the American way of life; I have been visiting museums, theatres, galleries, monuments, collections of painting and numerous other places of art; and not to make this a very large enumeration, I must tell you that I have tried to be as open-minded as possible in order to grasp all that I can of this wonderful environment."

An outstanding example of effectiveness of the program for United States students is the experience of Richard Paul Schaedel, a graduate student at Yale University who received travel and maintenance grants for the study of stone sculpture in the Andean area of Peru. Mr. Schaedel was asked by the University of Trujillo to establish an Institute of Anthropology at that institution and to become its first director. He drew up the proposed organiation of the Institute and accepted the position of director.

In discussing the Latin American student program, mention should be made of the large number of American veterans who are taking advantage of their educational benefits to study in Latin American countries. As of February of this year, 876 ex-GIs were studying in 19 of the other American republics, 649 of whom were pursuing their work in Mexico and 110 in Cuba.

Likewise, no discussion of this subject would be complete without mention of the in-service and industrial training programs which bring many young citizens of the other American republics to the United States for intensive on-the-job study in their fields of specialiation. For example, in the field of chemistry, the United States Public Health Service last year assisted a Colombian citizen connected with the Medellin Public Health Department to spend a year doing post-graduate work in bio-chemistry. The Department of Agriculture has also carried on an extensive program of training for young Latin Americans in many fields related to chemistry.

A majority of trainees in human nutrition and home economics are assigned to land grant colleges. Their programs have been more practical than theoretical. Laboratory training is offered in the chemistry of dairy products as well as the best methods of packaging, preparing and storing these products. Private resources are used in cases where trainees desire to learn food processing.

Most of the work on animal nutrition is done at experimental stations and at state colleges, where trainees receive instruction in the

state colleges and supplement the instruction by practical work in the experimental stations.

Trainees also learn the best utilization of plant fibres and the effectivenes of insecticides. In the United States a chemist from Peru now studies the extraction of rotenone from barbasco.

Mrs. Juracy Tejo, Chief of the Central Laboratory of the Rio Grande do Sul (Brazil) Department of Agriculture, is now studying food processing. She is working with state colleges and has also been a special student at Cornell University where she had access to the laboratory facilities and consulted with the university staff. She has also visited numerous commercial firms for observation purposes.

Training on plant and animal disease cures is offered in the Bureau of Animal Industry.

The National Bureau of Standards also gives training in fields relating to chemistry. Persons from Mexico and Colombia now receive training in the United States in spectographic analysis. Analyses are made of trace elements for the study of mineral resources, looking toward the possibility of locating deposits.

Mexicans and Bolivians are now receiving training in electrodeposition. They are assigned to work in the National Bureau of Standards with analysts. After they have mastered the technique by observation, they are given experimental runs and when those are successfully completed, they assist in the laboratories and thus obtain additional practical experience.

In the field of industrial training, the E. I. duPont de Nemours Company recently offered a period of training in their organic chemicals department technical laboratory to a young man from Brazil. The Joseph E. Seagram Company has also trained many young Latin Americans. Under the "Industrial Fermentation Training Program for the Republic of Cuba" twelve candidates from Havana University received training in alcohol distillation and chemistry. As the graduates returned to Cuba, both the School of Sugar Chemistry of the University of Havana and the Association of Sugar Chemists praised very highly the progress made by the trainees in their work at Seagram's.

Dr. F. Webster McBryde instructs a class of Latin American technicians in "Geography in Census Work." This class is part of a comprehensive course of instruction given to selected Latin American officials on census techniques and procedures by the United States Bureau of the Census as its contribution to the "Cooperation with the American Republics" program.

With the cooperation of the Puerto Rican Development Company, twelve young Puerto Ricans received training at Seagram's in the production of food yeast. This project is especially vital to the economy of Puerto Rico because of the scarcity of meat, for which the food yeast is a good substitute in terms of energy-giving proteins and vitamins.

Nationals of Uruguay, Paraguay and Nicaragua have also received training at Seagram's in the practical aspects of the fermentation industry.

Within a few years, the Seagram Company will have several hundred "graduates" in various parts of the world, most of them putting to practice their training received in the United States, in dealing with two vital problems—fuel and food. To India, the Philippines, and most of South America, which have inadequate supplies of natural fuel, the production of alcohol from waste or surplus agricultural crops is of great importance. In Argentina and elsewhere before long plants directed by Seagram "alumni" will produce penicillin and streptomycin for the relief of disease.

Thus, in ways unforseen at the time of the program's origin, the exchanges between the United States and Latin American countries are paying dividends not only to the countries directly concerned but to the advancement of human resources from which people of many lands will profit. This is an achievement not alone of Government or of private industry, but is the product of genuine cooperation among both, a joint investment in ingenuity and enterprise, bearing results whose full effects will be felt for generations.

AFCA NEWS NOTES

Official Orders

Maj. John G. Hoffman, Jr., relieved from Staff and Faculty CmlC School, and assigned to Student Detachment, Army CmlC School.

Capt. George L. Marker, relieved from Student Detachment Language School, Presidio of Monterey, Calif., and assigned to 39 Whitehall St., New York City.

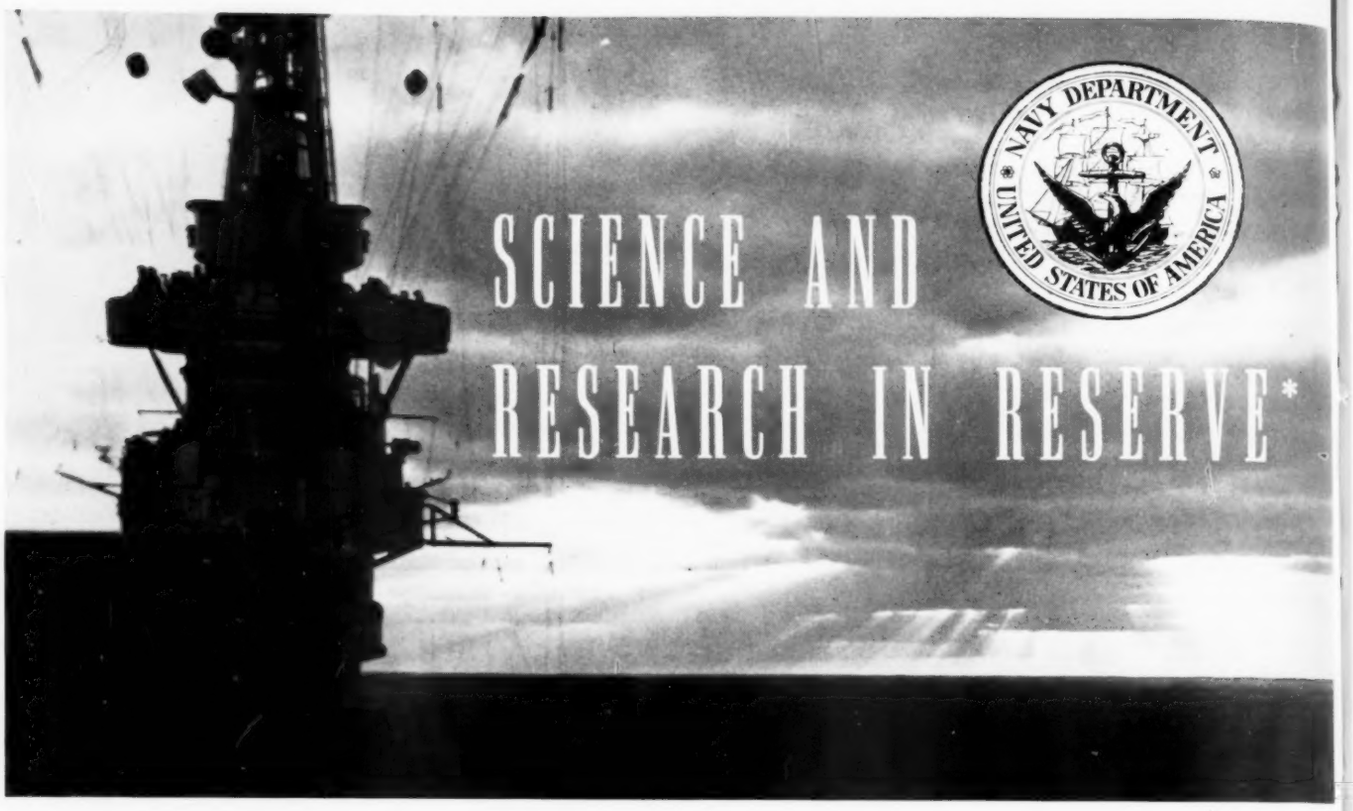
1st Lt. William H. DeVausney, relieved from Personnel Center, Camp Stoneman, Calif., and assigned to Hq. Army Cml Center.

Lt. Col. Roy W. Muth, relieved from Sup and Proc Div OC Cml, Army Cml Center and assigned to C & GSC, Fort Leavenworth, Kansas, for duty with staff and faculty.

2nd Lt. Theodore R. MacDonnell, relieved from Det of Patients, Walter Reed Hospital and assigned to Hq. Army Cml Center.

ORC Unit Activation

An activation ceremony for the 394th Chemical Smoke Generator Company, Army Organized Reserve Corps, was held last month at the Gulf Oil Corporation in Philadelphia. Principal speaker at the activation ceremony was Mr. Howard R. Timms, Personnel Director, Gulf Oil of Philadelphia. Capt. Aaron Dreydoppel, 22nd and Curtain Sts., Philadelphia, is commanding officer of the new Reserve unit.



SCIENCE AND RESEARCH IN RESERVE*

Science gave us the tools of victory in World War II.

As the world's largest technical and engineering organization, the United States Navy has had one major and continuous assignment since its establishment—to keep abreast of the discoveries and inventions of the world's scientists.

At the war's end two out of every three men in the naval establishment were technicians. They had to know how to operate radar and sonar. They were specialists in hydrodynamics and aerodynamics. They learned to fire rockets, operate jet and diesel engines, launch guided missiles. They trained on synthetic devices like the gunairstructor," and participated in simulated attacks in complicated mock-ups to prepare themselves for combat. On board ship they lived surrounded by the most ingenious machinery and equipment ever assembled in the field of electricity, metallurgy, nucleonics, optics, mechanics, radio and sound.

Today, with the aim of keeping pace with the changing world of science and maintaining our peacetime "security through research," the Navy's Office of Naval Research sponsors some 1,278 research projects in practically every major academic, government and industrial laboratory in the nation. At the same time, in order to develop a closer alliance with men working in the civilian fields of research and science, it has established the Naval Research Reserve.

With a proposed strength of 5,000 officers, including Waves, and enlisted men, the newly created Research Reserve's mission is to provide an adequate trained force of Reserve personnel now in civilian jobs who are available for mobilization in the event of emergency, for assignment to activities under the control of the Office of Naval Research.

Authorized in May, 1948, the program calls for establishment of Volunteer Research Units which meet all over the country, at universities and colleges, Naval Research Training Centers, or laboratories where research in naval projects is now going on.

Just three weeks after the research program was set up the first Navy scientific seminar ever called met at ONR headquarters, where 100 Reserve officers gathered for 14 days to visit science laboratories and attend courses on the many phases of the Navy's basic research program.

Within a month the first Volunteer Reserve Research activity, Unit W-1, was established and met at the Naval Gun Factory in Washington, D. C. Two more units were organized on the west coast, in San Francisco and the University of California at Berkeley. Plans call for the enrollment of more than 100 volunteer units.

Members of the Research Reserve vary from "human ecologists," ultrasonic scientists and physicists to experts in power and propulsion, patent specialists and explorers. The research units are not limited to scientists working on laboratory experiments but are open also to specialists in the supervision, coordination, supply analysis and evaluation of research.

The Research Reserve program is under the administrative supervision of the Office of Naval Research and its five branches at Boston, New York, Chicago, San Francisco and Los Angeles.

In addition to conducting basic research, ONR correlates scientific material for the bureaus of the Navy, conducts field activities such as the Naval Research Laboratory in Washington, D. C., the Special Devices Center, Port Washington, N. Y., and the Underwater Sound Laboratory, Orlando, Fla. The new Research Reserve component becomes an integral part of ONR, which will supervise its inactive training program and make available its facilities for annual training duty.

ONR itself is a new organization, having been set up in 1946, but the Navy's interest in science is almost as old as the Navy itself. Beginning in the early 1800s the Navy was faced with scientific developments which began to

*Reprinted from ALL HANDS, official information bulletin of the Bureau of Personnel, Department of the Navy.

change radically both equipment and methods of naval warfare.

Today in the Naval Research Laboratory at Anacostia, D.C., we have one of the largest and best equipped laboratories in the world. A thousand scientist and engineers housed in 50 buildings investigate the problems of the Navy. From these people and facilities have come such discoveries as radar and the liquid thermal diffusion process for separating isotopes used in the manufacture of the atomic bomb.

In its new Research Reserve component ONR will have an additional force of scientists, research men and technicians who will help to keep our surface, air and underwater fleets as modern as possible.

The volunteer units will consist of either composite or specialized groups. They are open to Reservists in the following fields:

Basic Sciences—Physics, chemistry, mechanics, mathematics, geology, biology and psychology.

Naval sciences—power and propulsion, armament, missiles, flight, geographic exploration, amphibious and undersea warfare, underwater sound reference, etc.

Technical—Synthetic training devices, training aids, technical instruction and information, patents, contracts, procurement and facilities.

Upon the recommendation of ONR or its branch offices, district commandants are authorized to establish volunteer research units with a minimum membership of 20 officers and any number of enlisted personnel. Sub-units of less than 20 officers may be formed, attached to the appropriate VRU for administrative purposes. The units meet ordinarily twice a month for two-hour sessions.

The training program for the volunteer research units includes:

Study of pertinent parts of courses from established schools and colleges of the armed forces.

Review and editing of technical manuals and publications.

Work on certain research and development problems as assigned by the Chief of Naval Research.

Orientation in the ONR research program and development activities.

Review or formulation of plans to assist research activities in the accomplishment of their mission.

Formulation of training programs encompassing research and problems or projects of interest to the Navy. Reserve officers, in view of their technical qualifications, will be encouraged to formulate their own training programs, which may include associations with Organized Reserve Research and Development groups, or subgroups of the Army or Air Forces when no unit of the Naval Reserve is located in the vicinity.

Individual training, for Reservists of outstanding professional reputation whose services may be utilized on a consultant basis by all agencies of the Navy for technological assistance in the establishment or solution of research plans and programs.

Reservists will be credited for a commensurate number of hours for their inactive duty training.

Many Reservists are included among the 2,977 senior scientists and 2,405 graduate students who are conducting experiments sponsored by the Navy at university and industrial laboratories.

Naval peacetime research includes "human engineering," the science of bridging the gap between human tolerance and capacity in the stress of high speed, high altitudes and new machines. It includes studies of fog dispersal, ultrasonics, exploration of rare elements and "Project Cirrus," a rain- and snow-making program conducted in conjunction with the Army Signal Corps and a commercial firm.

Annual training for Reserve scientists may be carried on at the many naval research activities, at ONR headquarters in Washington, D.C., and its branch offices.

Typical of the two-weeks' training periods was the science seminar held this June. One hundred Reserve officers, including three Waves, from 28 states met in ONR's offices and were launched on a concentrated program ranging from lectures on atomic science to research in human relations and its value to the Navy. The Navy provided special classes in psychophysiology, mechanics and materials, nuclear physics, arctic research, fluid mechanics, electronics, biochemistry, geophysics, microbiology and chemistry.

Obviously each officer could not attend all the lectures or meet with all specialist groups, but each Reservist was given a choice of which to attend. Field trips were organized to the Naval Ordnance Laboratory at White Oak, Md., the Naval Research Laboratory at Anacostia, D.C., the Applied Physics Laboratory and Taylor Model Basin in Washington, D.C.

Wind tunnels were examined in operation, cutaway models of diesel and jet engines were studied, along with rockets, turbine generators, thermal diffusion plants and heat power laboratories.

Purpose of the seminar was to acquaint the civilian scientists with the scope of the research program and the plans of the new Research Reserve.

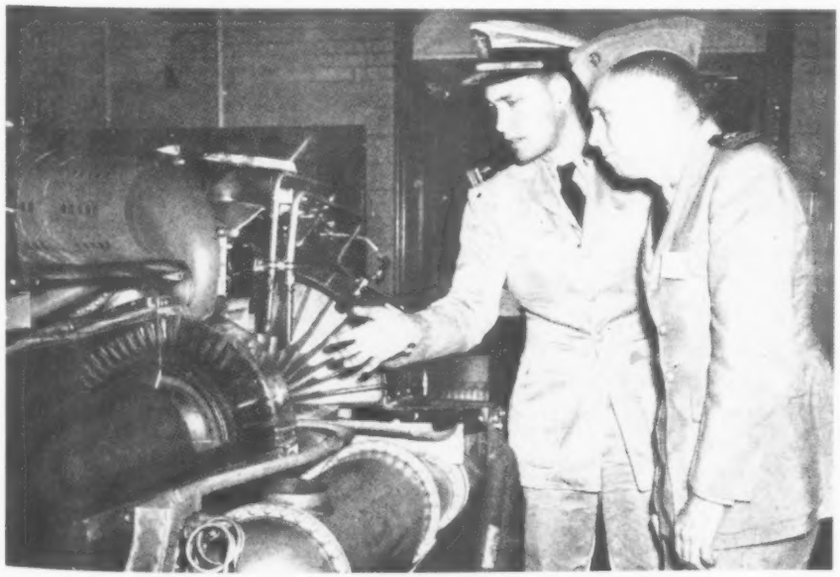
Reservists in research units may request the opportunity of studying special programs now being conducted by the Navy.

A steel-piercing eye, known as the "betatron," may be examined at the Naval Ordnance laboratory where the machine is used to detect flaws in castings and weldings of naval guns and and other equipment.

At the Underwater Sound Laboratory, Reservists may participate

(*Continued on Page 25*)

FOR THE RECORD
At war's end two out of three were technicians.



THE "DECONS" AND THE AIR LIFT

THE STORY OF HOW THE CHEMICAL CORPS' TRUCK-MOUNTED, POWER-DRIVEN DECONTAMINATION APPARATUS PLAYED A PART IN SOLVING THE AIR FORCE PROBLEM OF DEFROSTING CONTROL AND LIFTING SURFACES OF AIRCRAFT.

By Charles S. Loucks

One of the innumerable winter time problems that faced the US Air Force during "Operation-Vittles" was that of finding a way to quickly defrost control and lifting surfaces of aircraft that had been parked, prior to flight, in freezing temperatures. The Chemical Corps' truck-mounted, power-driven decontamination apparatus played an important part in solving this problem.

Until this time the accepted method had been for members of the ground crew to equip themselves with brooms and to sweep the frost from these critical surfaces as well as possible. For planes the size of the C-54, the "work horse" of the Air Lift, this job required several man hours of a crew using ladders and brooms and working on the tops of icy wing surfaces. Not only had numerous injuries been sustained as a result of falls on and from these slippery surfaces, but it was difficult for the ground crews to keep a sufficient number of planes operational. If the plane was not immediately used after having been swept clear, additional frost made another sweeping job necessary before taking to the air.

Inasmuch as both time-saving and safety were objectives, work on the solution of this problem was given a high priority.

The problem consisted of two parts. The first was the development of a satisfactory frost cutting material and the second was the development of a method and equipment for applying the material.

During the search for a suitable material it was found that a mixture of kerosene and alcohol applied to the frosted surfaces, readily cut the frost. However, this mixture was found to be objectionable due to vaporization or combustion, when the engines were started, of the mixture that had seeped into the engine nacelles or mountings. Few actual fires were started but smoke was produced in frightening volume. A mixture of alcohol and glycerin was then tried and found to be considerably better but the scarcity of glycerin and its relative high cost discouraged its further use. Finally isoprophyl alcohol was tested and found to be the most satisfactory of any material tried.

Very early in the attempt to develop the method and equipment, someone suggested that the Chemical Corps' well known power-driven decontamination apparatus (truck mounted) be utilized. As most Chemical Corps veterans, and many others, know from first hand experience, it had been used both during and after the war for such varied purposes as a portable shower, for hauling drinking water, as a prime mover, as auxiliary fire fighting apparatus and for many other jobs not contemplated when it was originally designed. It was, therefore, only natural that this

(Continued on Page 38)

OLD METHOD

The accepted method had been for members of the ground crew to equip themselves with brooms and to sweep the frost from these critical surfaces as well as possible.

NEW METHOD

With one pass around the aircraft using the Power-Driven Decontaminating Apparatus, the same job is done here as in No. 1 but much better and in a small fraction of the time.

GROUP AND SUSTAINING MEMBERS

OF THE ARMED FORCES CHEMICAL ASSOCIATION

SUSTAINING MEMBERS

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Niagara Alkali Company, Niagara Falls, N. Y.
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Buffalo Electro-Chemical Co., Inc., Buffalo, N. Y.
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B. F. Goodrich Chemical Co., Cleveland, Ohio
The Harshaw Chemical Co., Cleveland, Ohio
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Hooker Electrochemical Co., Niagara Falls, N. Y.
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Koppers Company, Inc., Pittsburgh, Pa.
Mathieson Chemical Corp., New York, N. Y.
Merck and Co., Inc., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
National Fireworks, Inc., West Hanover, Mass.
Pemco Corporation, Baltimore, Md.
Pfister Chemical Works, Inc., Ridgefield, N. J.
Chas. Pfizer and Company, Inc., Brooklyn, N. Y.
Pittsburgh Coke and Chemical Co., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Columbia Chemical Div., Pittsburgh, Pa.
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Stauffer Chemical Co., New York, N. Y.
Sun Oil Company, Philadelphia, Pa.
The Texas Company, New York, N. Y.
Victor Chemical Works, Chicago, Ill.
Wyandotte Chemicals Corp., Wyandotte, Mich.
Zenith Plastics Co., Gardena, Calif.

Rubber Industries

Firestone Rubber and Latex Co., Fall River, Mass.
The General Tire and Rubber Co., Wabash, Ind.
The Goodyear Tire & Rubber Co., Akron, Ohio
Industrial Rubber Goods Co., St. Joseph, Mich.
Sheller Manufacturing Corp., Dryden Rubber Div., Chicago, Ill.
United States Rubber Co., New York, N. Y.

Metal Fabricating Industries

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Casco Products Co., Inc., Bridgeport, Conn.
Day and Night Manufacturing Co., Monrovia, Calif.
Electromaster, Inc., Mt. Clemens, Mich.
Empire Stove Co., Belleville, Ill.
Fraser & Johnston Co., San Francisco, Calif.
The Guiberson Corp., Dallas, Texas
Handy & Harman, New York, N. Y.
National Can Corp., New York, N. Y.
J. V. Pilcher Manufacturing Co., Inc., Louisville, Ky.
Rowe Manufacturing Co., Inc., Whippany, N. J.
Stewart Die Casting Co., Chicago, Ill.
The Vulcan Copper and Supply Co., Cincinnati, Ohio
World Steel Products Corp., New York, N. Y.
Zaremba Company, Buffalo, N. Y.

Others

Armstrong Cork Company, Lancaster, Pa.
The H. K. Ferguson Co., Inc., Cleveland, Ohio
The Heil Company, Milwaukee, Wis.

"PITTSBURGH"
COAL-CHEMICALS

ACTIVATED CARBON
ALKYL METHYL PYRIDINIUM CHLORIDE
ALPHA NAPHTHYLTHIOUREA
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CREOSOTE
CRESOL—META PARA, ORTHO
2,4-DICHLOROPHENOXYACETIC ACID
DINITRO-ORTHOCRESOL
NAPHTHA, HEAVY SOLVENT
NAPHTHALENE
PARA AMINO PHENYL MERCURIC ACETATE
PHENOL
PHTHALIC ANHYDRIDE
PICOLINE—ALPHA, BETA AND GAMMA
PIPE LINE ENAMEL
PYRIDINE—MEDICINAL AND INDUSTRIAL
SODIUM CYANIDE
SODIUM THIOCYANATE
SULPHATE OF AMMONIA
SULPHURIC ACID—60°, 66° AND OLEUM
TAR ACID OIL DISINFECTANTS
TAR—CRUDE AND ROAD
TOLUOL—NITRATION AND COMMERCIAL
XYLOL—10°, 5° AND 3°

PITTSBURGH
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WE'VE BEEN ASKED

How may I secure my letter of appointment in the Army Organized Reserve Corps?

Write the Adjutant General of the Army, Washington, D.C. requesting it.

* * *

I am now working under Civil Service and in about four years will have reached the 15-year retirement period if my active military time can be included. May I be retired as a reserve officer and also retire at the end of the 15-year period in Civil Service?

Yes.

* * *

Is one drawing disability compensation entitled to Reserve retirement under the provisions of Public Law 810?

No, says the Comptroller General.

* * *

I wish to convert my National Service Life Insurance. Do I get credit for all the money I paid on my term insurance?

No, because the premiums paid on your term insurance were required to pay for the cost of the protection afforded. If you convert now, you must pay the full premium required at your attained age for the converted insurance.

* * *

Did any Reserve units exist prior to World War II?

There were 27 infantry divisions, 3 cavalry divisions in addition to a large number of non-divisional units which were organized consisting of officers only prior to WW II. These units were not only organized for training purposes but all mobilization plans prior to 1939 provided that the units would be ordered to active duty as units in case of war. However, in 1939 the Army ordered Reserves to duty as individuals rather than units diviating from original plans.

* * *

Is there any way that an officer who will reach age 60 prior to obtaining his 20 years satisfactory years can qualify for retirement under PL 810? For example, an officer 50 years old with 7 active and inactive years total to date.

Under the provisions of Public Law 810, an officer, to qualify for retirement, must have a total of twenty years satisfactory service. There is no provision in the law which permits officers to secure additional credits after reaching age sixty.

* * *

Does an officer who has his Active Reserve commission transferred to a commission in the Inactive Reserve retain his Arm or Service?

Yes.

* * *

Is one who holds a commission in the Inactive or Honorary Reserve subject to active duty call in event of emergency?

Yes. Holding a Reserve commission, irrespective of whether it is in the Active, Honorary, Inactive or Voluntary, places an individual in a category of being ordered to active duty when and if his services are required by the government.

MINING DEMONSTRATION

Experimental Oil-Shale Mine

RIFLE, COLORADO

"... THIS DEMONSTRATION OF THE TECHNOLOGY OF OIL-SHALE MINING IS TIMELY, FOR THE DATA MAY BE USED IN AN ECONOMIC EVALUATION OF THIS PROSPECTIVE NEW INDUSTRY WHICH HAS A DIRECT MILITARY VALUE AS A SOURCE OF DIESEL OIL AND JET PLANE FUEL."

A large number of mining engineers, mine equipment manufacturers, oil company representatives and other interested persons inspected the Bureau of Mines Oil-Shale Mining Demonstration on September 20-21 at Rifle, Colo. This inspection was about midway in a month long test run designed to make a new determination of the direct cost of mining oil-shale.

This demonstration of the technology of oil-shale mining is timely, for the data may be used in an economic evaluation of this prospective new industry which has a direct military value as a source of Diesel oil and jet plane fuel.

The scope of operations in the experimental oil-shale mine is the same as that of one unit in a future commercial mine. The size of a full-scale operation would depend on the number of units employed. Direct costs of each unit would be the same; hence, a direct cost established at the experimental mine would be applicable to a commercial operation. Economic considerations indicate that a single oil-shale enterprise would require a minimum of 15,000 tons of oil-shale daily.

Mining Operations

The oil-shale mine at Rifle is in the Parachute member of the Green River formation, which extends through western Colorado into Utah and Wyoming. The main oil-shale measure is near the top of the Green River formation and averages about 500 feet thick; it will yield about 15 gallons or 0.36 barrel of shale oil per ton. The lower horizon of the 500-foot measure, called the Mahogany Ledge, varies from 50 to 100 feet in thickness and averages about 30 gallons or 0.7 barrel per ton.

In the area of the mine, the oil-shale measure outcrops in bold cliffs for a distance of 145 miles. As indicated by sampling of outcrops and by core drilling, the 500-foot oil-shale measure over an area of 1,000 square miles may contain 300 billion barrels of shale oil. The Mahogany Ledge alone represents about 100 billion barrels.

It appears that the first commerical exploitation of oil-shale will be in the richer Mahogany Ledge. Here at the experimental mine this ledge is 73 feet thick. It is overlaid by a thick, strong bed of lean gray marlstone. An uncemented bedding plant at the top of the Mahogany Ledge provides a smooth roof stone throughout the mine.

An underground crew of 13 men is employed for mining on the top level. These men produce approximately 1,500 tons of shale in each 8-hour shift. All operations are highly mechanized, and each piece of equipment was chosen with the purpose of attaining the highest possible output per manshift. Standard equipment is used wherever practicable, but several of the machines had to be designed and constructed specifically for this job.

Two 4-week test runs were made on the top level within the last year, employing what would be actual operating procedures in one unit of a commercial mine. The first of the runs was completed in September 1948 and the second in May 1949. An average of 1,491 tons of shale was broken each day of the second test run, increasing the average output per man shift of underground labor to 111 tons. The output per man shift of total labor, including direct supervision, engineering, and maintenance, was 92.7 tons. The direct cost of mining was 32.9 cents.

Processing Operations

The shale-preparation system consists of crushing, screening, storing, weighing and conveying equipment. Although three crushers and two sets of vibrating screens are available, only two crushers and one set of vibrating screens would be required for routine operations. The third crusher and accompanying screens are needed only when very fine particle-size shale is desired. The usual particle-size range for shale fed to the N-T-U retorts is ½ to 3½ inches, and material under ½ inch is rejected as "fines." For certain experiments, however, the tertiary crusher has been used to produce material less than ¼ inch in size.

Essentially, retorting consists of beating oil shale to a temperature at which thermal decomposition of the organic matter in shale takes place to form shale oil, vapor, gas, and carbon. Oil is recovered from the vapor by cooling and condensing. The means of applying heat and the mechanical arrangements for moving shole through the retorting system offer infinite possibilities for variation, which accounts for the great number of patents that have been granted for oil-shale retorts.

Two types of retorting processes are in operation at the Bureau's Oil-Shale Demonstration Plant—the N-T-U and the gas-flow. The N-T-U is an example of an internal-combustion type retort, in which hot gases generated within the retort flow downward and heat a stationary shale bed. It is a batch-type process and was the first retorting installation built at Rifle. In this system, a centrifugal blower creates a draft, which causes the gases to move from the top of the retort to the bottom. Residual carbon in the spent shale burns, forming hot gases, which heat the raw shale below the combustion zone and drive off the oil. The vapors are cooled in a condensing system, and the oil is recovered. The organic residue or residual carbon remaining in the retorted shale provides fuel for the process.

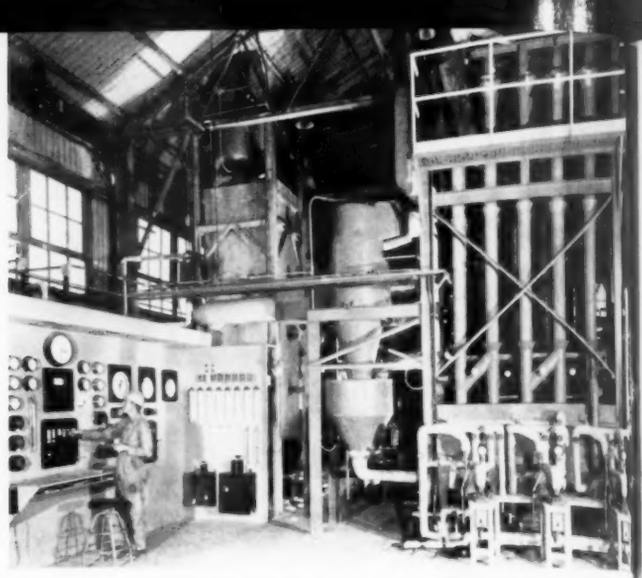
In the gas-flow process developed by the Bureau of Mines, crushed shale moves continuously downward through the retort and is heated by a cross flow of hot gas. A pilot plant embodying this principle has been designed and built at the Oil-Shale Demonstration Plant. It has the advantages of being continuous, achieving high yields of oil, and producing a combustible gas that can be used for heating

(Bureau of Mines photo)

Experimental refinery at the Oil-Shale Demonstration Plant of the Bureau of Mines near Rifle, Colo. This highly flexible unit can apply to shale oil virtually any refinery technique in use today. Equipment, from right to left, heater (partly obscured), reaction chamber, coke chamber, flash-fractionator tower, side-cut stripper, stabilizer, and rerun column.

Mine yard and road carved in the oil shale cliffs and talus slopes overlooking the Oil-Shale Demonstration Plant of the Bureau of Mines near Rifle, Colorado. One of the selective mine's portals may be seen at right, and the two openings to the underground quarry beyond the buildings at upper center.

(Bureau of Mines photo)



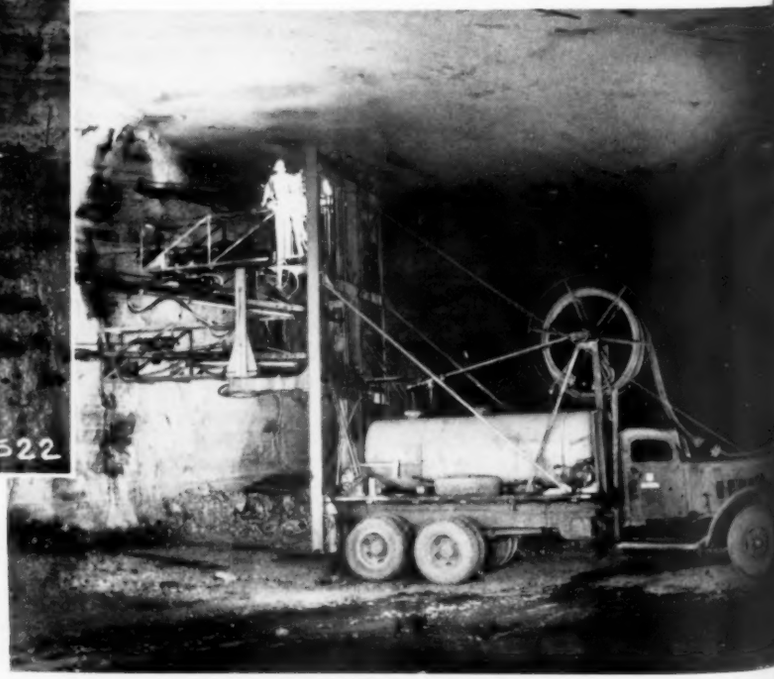
Gas flow retort, a continuous pilot plant for extracting oil from shale at the Bureau of Mines Oil-Shale Demonstration Plant near Rifle, Colo. Shale moving downward through the square structure beyond the control board is heated by a transverse flow of hot gases. Oil is recovered in the condensing system at right.

and for generating steam and power. In the pilot plant now in operation, heat supplied by burning propane is transferred to a carrier gas by means of regenerative pebble stoves. In a commercial unit, heat would be provided not by propane but by burning the organic residue in the spent shale, together with a part of the make-gas from the process. Experimental work is being carried on to develop a suitable spent-shale burner.

Completed and placed in operation in July of this year, the experimental shale-oil refinery consists of a thermal refining unit and a cold-acid treating plant. The refinery is quite flexible and is capable of all the usual thermal operations, including viscosity breaking, recycle, and once-through cracking, reforming, atmospheric distillation, and cooking. The cracking unit consists of a single pass, cell-type, up-shot heater, a flash distillation column, side cut stripper, an absorber, and a stabilizer. The cold-acid treating equipment consists of six countercurrent packed columns for acid and caustic treating, with refrigeration equipment, a re-run column to remove the polymers re-

Mobile compressor station in the underground quarry at the Bureau of Mines Oil-Shale Demonstration Plant near Rifle, Colo.

(Bureau of Mines photo)



(Bureau of Mines photo)

Miners are shown removing loose oil shale from the face and roof with the aid of a portable scaling rig in the underground quarry, Bureau of Mines Oil-Shale Demonstration Plant.

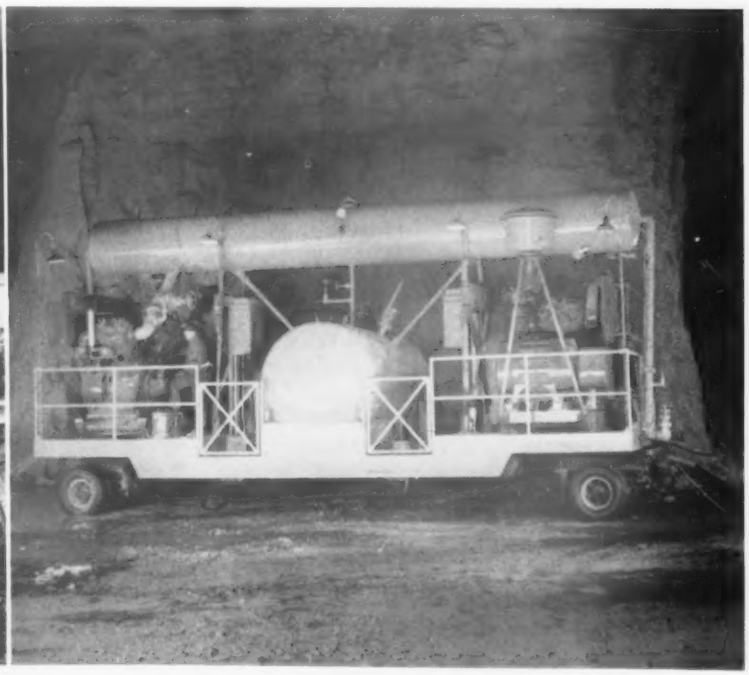
(Bureau of Mines photo)

Mobile blaster's platform aids miners charging dynamite into the upper drill holes in the underground quarry, Bureau of Mines Oil-Shale Demonstration Plant.

sulting from the acid treating, and a conventional doctor sweetening unit.

The Diesel oil used as fuel in trucks and other equipment in the mining operation was made from N-T-U shale oil in the demonstration refinery. It is a mixture of cracked and straight-run fractions that have been treated to specification. Other products made to date are gasoline, burner fuels, coke, and intermediate stocks.

In a single bite, this electric shovel loads three cubic yards of broken oil shale into a 15-ton Diesel truck deep within the underground quarry at the Oil-Shale Demonstration Plant.



Multiple drill rig used on the top or advance level of the Experimental Oil-Shale Mine near Rifle, Colo. Mounting four drills and operated by two men, this specially designed rig will drill out a round of 72 15-foot holes in about six hours.

(Bureau of Mines photo)

Congressional Record
United States of America
PROCEEDINGS AND DEBATES OF THE 81ST CONGRESS, FIRST SESSION

LET THE RECORD SPEAK!

Remarks of Hon. Robert Sikes
U. S. House of Representatives

Mr. SIKES. Mr. Speaker, some of the world's most valuable work in medical research is being done by a little known branch of the United States Army—the Army Chemical Corps. It is this branch of the service which is charged with gas warfare and bacteriological warfare; at mention of which most civilians shudder and pass on to gentler topics.

But this is the branch of the service which did the preliminary work leading to the now successful techniques used in the cure of blue babies. This is the branch of the service which has pointed the way to possible control of epilepsy. This is the branch of the service which produced some of today's most valuable insecticides and rodenticides.

These things the Chemical Corps considers a part of its peacetime job. Some of its people, military and civilian are internationally known scientists and medical men. They are doing a job for the Government despite the fact that most of them could command higher salaries and possibly greater renown elsewhere.

But let us go back to gas warfare and bacteriological warfare. In addition to developmental work, the Corps also is working feverishly to perfect defenses against these dread weapons. It is taking the common-sense view that future war may involve the use of one or both, with or without our consent, and that we must be prepared accordingly.

There is no point in minimizing the horror of these weapons. Either can produce widespread death in a matter of minutes unless effective countermeasures are at hand. But it is time we realized that war in any form is not a pretty thing. A man, or a child for that matter, is just as dead from a shrapnel burst which tears open his stomach or an atomic blast which burns off his skin as from chemical agents.

Perhaps this would be well to consider: The Chemical Corps which has produced both deadly weapons and great cures may with proper incentive produce a painless war. This is not necessarily pure fancy. The Chemical Corps today may not be far from the production of a gas which temporarily destroys the will to fight but does no lasting harm. That would make short shift of any aggressor and render his defenses impotent. Such a weapon, properly guarded, could be much more valuable than the atomic bomb, for it would be free from the destructiveness of the atomic bomb.

As a part of the price of war, we have accepted the responsibility of helping to rehabilitate the lives and property of other contestants. We have found this a very costly practice, not much less costly in fact than war.

Would it not be advantageous to be able to fight wars without this constantly increasing cost, without the ever greater destruction of life and property? Even assuming that we could escape invasion, or bombing, or gas, or bacteriological warfare, which is no longer a safe assumption, we in this Nation spent 300,000 lives, $500,000,000,, and a great part of our natural resources in World War II. And the rest of the world thinks we got off lightly.

This is not a vain hope which I advance. Ask the Chemical Corps. They think such a job can be done. It is worth trying.

CONGRESSMAN ROBERT SIKES
"Ask the Chemical Corps"

Now, just to show that I am not talking at random, I want to tell you something about the organization and work of the Chemical Corps.

Some Nonmilitary Applications of Chemical Warfare Research

The Chemical Corps, formerly called the Chemical Warfare Service, is one of the Army's seven technical services. Its three main responsibilities to the National Military Establishment are:

First. To develop and procure chemical and other toxicological agents and weapons.

Second. To evolve and teach new techniques and tactics of offensive and defensive toxicological warfare, including defense against atomic weapons.

Third. To invent and perfect methods, techniques, and equipment for detecting and resisting all known toxic agents.

In addition the Chief of the Chemical Corps serves as adviser to the Secretary of Defense and the Secretary of the Army in all matters pertaining to toxicological warfare.

The largest single peacetime operation of the Chemical Corps is, of course, that of research and development. Efforts toward maintaining America's supremacy in waging and resisting warfare involving fire, smoke, and toxic agents necessitate a never-ending program of basic and advanced scientific research.

Such a research program, conducted by the Nation's foremost scientists in arsenals, colleges, and commercial laboratories from coast to coast, inevitably produces as a byproduct a wealth of nonmilitary discoveries of immense value to industry, agriculture, and medicine.

One important byproduct of chemical warfare research is the development of improved agents for combating insect and rodent pests which are not only of military importance, but destructive economically and a menace to the health of any community. It is perhaps not generally realized that some of the most potent of the newer

insecticides and rodenticides were found incidentally in the course of a search for more effective military weapons. Outstanding examples are the insecticides hexaethyltetraphosphate—HETP, tetraethyl pyrophosphate—TEPP, and parathion, as well as rodenticide 1080.

In order to assure to the Nation these potential benefits, the Medical Division of the Chemical Corps routinely examines new compounds produced during synthesis of candidate chemical warfare agents for their possible usefulness as insecticides and rodenticides. A staff of entomologists and toxicologists carries on this work. At the same time, these specialists are actively engaged in finding out how such compounds produce their toxic effects. In this way we learn what vital processes of the pests are susceptible to chemical attack, and what types of chemical structure are most effective in damaging the functions necessary to life.

Such information, fed back to the synthetic chemists through scientific publications, enables him to proceed more swiftly and with greater economy toward his goal of production of better agents for the control of pests and disease-bearing vermin. Knowledge of how compounds act on the body to poison it is also essential for the development of antidotes and methods of treatment for cases of accidental poisoning during their manufacture or use and to the doctor who must apply them.

Thus, the work of Chemical Corps personnel in the fields of insect and rodent control, which arises naturally from the close chemical relationship between compounds which are toxic to various different forms of animal life, provides the community with lasting benefits which reach far beyond the primary objective of military preparedness. Conversely, since many of the vital processes are fundamentally similar in all living organisms, the basic information obtained from studies with insects and rats enables the Chemical Corps to get ahead more rapidly with its principal missions. The entomological group working with the Medical Division has found that insects provide particularly delicate tools for solving some of the problems connected with chemical-warfare research.

When proper precautions are not observed by the individuals who handle insecticides, they may be subjected to the poisonous effects of these toxic materials. Insecticides that contain TEPP and other related substances can produce in man pinpoint vision, weakened heart action, difficulty in breathing, diarrhea, and temporary brain injury as evidenced by convulsions. Such abnormal changes may be partially corrected by the use of the drug atropine. Recently at Army Chemical Center at Edgewood, Md., scientists have found that a new drug, tridione—used in treating epilepsy—controls the convulsions produced by such drugs as this group of insecticides. This treatment is in the experimental stage. If successful, tridione will be an important auxiliary in controlling convulsions which otherwise might be fatal to individuals poisoned by this group of insecticides.

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N. S. R. B.

If the United States should become involved in another war this little-publicized board will become the most powerful agency in government.

Quite unknown to some people and its duties and importance misunderstood by many others, the National Security Resources Board will, as time goes on, play an increasingly important role in President Truman's program of government. The task of NSRB is to advise Mr. Truman on how to coordinate military, industrial and civilian mobilization enabling the United States not to be caught short in case of emergency. But in these days of "cold war" activities the work of NSRB has taken on a greater significance.

The plans the board is drafting for the nation's defense will mesh with other economic projects the administration has mapped for the future. The legislation it will ennunciate can and may affect the future of many businesses and the course of the national economy.

If the United States should become involved in another war this little-publicized board will become overnight the most powerful agency in our government and is a body that businessmen and industrialists must take seriously as non-war military spending soars and as foreign policy planners may United States strategy against the spread of communism.

NSRB has functioned quietly for the past two years, seldom making spectacular news. It was created when Congress passed the National Security Act of 1947. This act set up the board as a permanent civilian agency of the U. S. Government, responsible only to the President. The Board may, at any time in war or peace, call into play the facilities and resources of any department, agency or bureau of the federal government.

If Congress declares war, or if the country is plunged into an emergency at a time when Congress can't act, NSRB would shift at once from a planning to an operating setup. It would establish temporary agencies to control prices, wages, the flow of raw materials, manpower, transportation and the conversion of production facilities.

Economic Survey

The agency has been a busy one. It has more than 100 "task groups" now at work surveying key industries to see how their present activities fit into the mobilization scheme. Eventually 250 such groups will be looking over every important industry in the country. NSRB is also studying a list of 100,000 machine tools that would have to be added to present installations in case of war. It is surveying the stockpile of strategic materials, looking over the nation's transportation network, studying sources of energy (electricity, gas, water, coal, petroleum) and considering the strategic relocation of industries.

Military men generally favor the NSRB setup even though it does not give them the upper hand in running the country in case of war. They claim they are willing to accept civilian direction in return for the speed-up that will be possible in industrial mobilization.

According to one top military expert, "The experience of every war has been early confusion, remedied only by intense effort. We know now what we must plan for, and the character of those plans will not be much effected by developments and techniques. The chief aim is preparedness—something made most urgent by the increased tempo of modern war."

U. S. Chamber of Commerce Urges

Business Support For ORC Recruiting

Full support of American business for current civilian reserve recruiting for the U. S. armed forces is urged by the board of directors of the Chamber of Commerce of the United States.

The board takes this action in approving a statement of the Chamber's National Defense Committee, of which Col. Dunlap C. Clark of Oakland, Calif., is chairman.

The statement emphasizes the importance of these reserves of "highly trained men, serving on a voluntary basis, who, with the Regular Army, Air Force, and Navy will become the nucleus of our fighting strength in a national emergency."

Colonel Clark pointed out that many employers have made important contributions toward strengthening reserve units in their own communities. He added that their continued support of the recruiting efforts of the reserves is needed in order to bring them to even the minimum level of effectiveness in our national defense program.

SCIENCE AND RESEARCH

(*Continued from Page 15*)

in the work carried on in the development of electronics apparatus and sound measuring techniques. Or they may study the new synthetic training equipment at the Special Devices Center.

Heart of the Navy's scientific work is the Naval Research Laboratory, where naval and civilian scientists join forces. Founded over a quarter of a century ago NRL had already begun its discoveries in the field of radar before it was officially commissioned. Scientists making radio field measurements across the Potomac in 1922 discovered that a ship passing through a radio field was detectable on the radio receiver. Fifteen years later the Navy had radar working over salt water on the destroyer *Leary*.

Another NRL contribution was in the field of pilotless aircraft. In 1923 its scientists flew an old Navy seaplane entirely by radio remote control, the first such flight to be made in this country.

NRL was the first U.S. government agency to undertake the study of the possibilities of atomic power. The first uranium pilot plant was started by Navy scientists in 1939 when an allocation of $1,500 was authorized to be expended on studies of the concentration of Uranium 235. That facility, which was similar to later developed plants, was turned over to the Manhattan Project.

From purely basic research studies come discoveries which profoundly affect the conduct of war. The Navy must know what is being done in all fields of science, since it is not only the largest engineering organization in the world, but also the largest shipbuilding agency, the biggest repair and mechanical activity, and the greatest user of power in the world.

Scientists and technicians, more than any other group, make the Navy what it is today. Personnel interested in joining a Volunteer Reserve Research unit may obtain application forms from ONR branch offices or write for information to the Chief of Naval Research, Attn: Code 103R, Navy Department, Washington, D.C.

To be eligible, officers should have a bachelor's degree, and enlisted personnel must possess technical training or manual skill of a high and specialized order which is of value to an activity of the Office of Naval Research.

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AFCA *Medals and Awards*

"THE ENTHUSIASM WITH WHICH THESE AWARDS HAVE BEEN WELCOMED BY ROTC STUDENTS IS A TRIBUTE FROM THESE YOUNG MEN WHO ARE DOING SOMETHING ABOVE THE AVERAGE IN PREPARING THEMSELVES FOR FUTURE EXIGENCIES."

By Dr. Walter E. Lawson
First Vice-President
Armed Forces Chemical Association

Public recognition of accomplishment is one of the greatest stimuli to further endeavor. The Armed Forces Chemical Association believes in the importance of this stimulus and has taken steps to recognize the accomplishments of leading students in the Reserve Officers Training Corps by awards of suitable medals and scrolls. Under the plan instituted this year, the student enrolled in each Chemical Corps unit of ROTC who is judged by the faculty and by the senior ROTC instructor to be the most able of all those in the Junior class is awarded a bronze medal with ribbon, a bar ribbon for his uniform, and a scroll suitably engraved attesting to the award. Since NROTC and Air ROTC do not have Chemical Corps units, the awards in these cases are made on a somewhat different basis, but the standards are just as high and the selection is just as critical. As a matter of fact, the interested and whole-hearted cooperation of Rear Admiral T. L. Sprague, Chief of the Bureau of Personnel and Lieutenant General George E. Stratemeyer, Commanding General, Continental Air Command, has led to the selection of chemists and chemical engineers from NROTC and Air ROTC units whose accomplishments place them equally as high in potential as those selected from the Chemical Corps units of ROTC.

The basis for selection of the candidate differs somewhat between the several colleges and universities at which the awards are authorized. The normal procedure is selection jointly by a senior member of the ROTC instruction staff and a representative of the academic faculty. General academic standing, ROTC standing, participation in extra-curricular activities, and general impressions of leadership are the main bases for selection. Former service in the Armed Forces is considered as a separate subject at some schools and as an item in ROTC standing at others. The care in selection is shown by the unwitting selection of the appointee at one school as the first choice at the Army Chemical Center ROTC Camp. Some method of recognition of such a choice will be developed for awards in succeeding years.

The medal is of heavy bronze as shown in the accompanying photographs, and is supported by a ribbon of cobalt blue and gold. A regulation campaign bar covered with the same type of ribbon is issued for daily wear on the ROTC uniform. Finally, there is given an engraved scroll testifying to the award to the cadet or midshipman in question.

The awards to cadets and midshipmen for the academic year ending in June, 1949 are as follows:

Chemical Corps Units, Army ROTC: David Dickson Adams, Mass. Inst. of Technology; Ralph Herbert Hahnfeld, Texas A. and M.; Robert Thomas Hewitt, Jr., Ohio State Univ.; Wilbur G. McMahan, Purdue Univ.; George B. Mock, Jr., Georgia Inst. Tech.

Chemists or Chemical Engineers, Naval ROTC: Leonard Lycurgus Attwell, Jr., Rice Institute; Everett Eugene Frizzell, Georgia Inst. Tech.; Lynn Eugene Schrier, Purdue Univ.; Jerome Douglas Swalen, Univ. of Minnesota.

Chemists or Chemical Engineers, Air ROTC: Harry William Lambe, Mass. Inst. of Technology; Harris E. Miller, Univ. of Denver; Thomas W. Mulcihy, Jr., Stanford Univ.

Army Chemical Center ROTC Camp: Robert D. Freeman, Georgia Inst. Tech.

The enthusiasm with which these awards have been welcomed by ROTC students is a tribute from these young men who are doing something above the average in preparing themselves for future exigencies. Moreover, the awards are helping the Armed Forces Chemical Association in its efforts to promote a continually improving understanding between the Armed Services and the Chemical Industry. These outstanding ROTC men will become leaders, perhaps in the Services, possibly in Industry. Whichever it be, the men chosen will remember these medals even as they do their Phi Beta Kappa or Sigma Xi keys, their membership in Scabbard and Blade, or any of the other honors bestowed on especially able men. The recognition will remain as a close bond and inevitably will deepen the interest and future relationships between civilian and military lives.

So far mention has been made only of awards to students engaged in military training corps activities. An entirely separate system has been set up for members of the Association. The main award in this case is a

MIDSHIPMAN JEROME D. SWALEN
University of Minnesota winner

CADET DAVID D. ADAMS
Massachusetts Institute of Technology winner

CADET HARRIS E. MILLER
University of Denver winner

molded wood plaque about nine inches in height and eight inches in breadth.

The background is natural wood color; the eagle is cobalt blue (any relationship to the NRA blue eagle is purely coincidental!); and the crossed retorts, A.F.C.A. lettering, and inscription plate are old gold. One of these plaques has been awarded to each of our group members, and a number have been presented to individual members who have devoted considerable time and effort to the support of the Association. In addition, the plaques are available to local chapters for presentation to their past presidents. Letters from representatives of a large proportion of our group members confirm the high regard in which these plaques are held. No plaque is for sale (except to chapters under specific designation for past presidents) and the award, therefore, really is for service to and support of the Association. Each Sustaining member is given an engraved scroll as very modest thanks for his contribution.

The letters from Navy and Air Corps officers confirm the belief of the Executive Commmittee that the awards aid distinctly in establishing closer and more friendly relations between the AFCA and these two Services. Chemistry is not limited either to the Department of the Army or to the Chemical Corps and anything that can be done to achieve closer contact with other branches leads to better understanding and higher mutual respect. The field of chemistry is not bounded by the horizons of gas warfare any more than chemistry of rubber is limited to studies of vulcanization or the chemistry of molds is confined to ways and means for minimizing the deterioration of field rations. Just as studies of rubber include the cracking of petroleum to form butadiene for synthetic rubber and investigation of molds has led to wonderful new agents in the antibiotics such as penicillin and streptomycin, so does chemistry deal with the greater portion of the activities of both the Navy and the Air Force. New armor plate and means for its penetration; better smokes for signals and elimination of tell-tale gases fron. torpedoes; and war gases and their defeat are opposing needs for the Navy. Fuels giving longer range for bombers and greater speed for interceptors; new alloys for stronger wing construction and for longer turbine life; and new lubricating oils for Arctic cold and desert heat are examples of prime needs for the Air Force. The Armed Forces Chemical Association will continue and will expand its efforts to bring about better appreciation of the various phases of the chemical industry by the three Armed Services, and a sounder and more complete understanding of the Services needs by the chemical industry.

Much of this improvement can be developed by the chapters. The national organization can make initial contacts; arrange for speakers, both by Service men before the chapters and by leaders of industry before technical groups in the Services; and recognize by awards the accomplishments of young men in college and older men in civilian life. But the chapters must do their part. With cooperation between all parties, the awards of the Armed Forces Chemical Association can become inspiring motives for further endeavor. Let each of us do his part.

PLAQUE PRESENTATION

Mrs. Lois P. Cunningham of Headquarters S-4, Army Chemical Center, being presented with a plaque for meritorious service to the Armed Forces Chemical Association by Dr. S. D. Silver, president of the Army Chemical Center Chapter. Mrs. Cunningham was instrumental in getting many new members for the Association in the recent membership drive. Also seen in the picture are (l. to r.) Mr. Rudolf Sealy, Chapter Director, Mr. Charles H. Andrus, Chapter 2d Vice-President, Mr. Gerald J. Fleming, Chapter Director, Lt. Col. Thomas A. Carilia, Miss Joyce Knight and Lt. Col. William H. B. Howard.

NEWS OF INDUSTRY

Pittsburgh Coke and Chemical Company

Service Manager

BENJAMIN H. MEANS

Appointment of Benjamin H. Means as Service Manager of Protective Coatings for the entire United States has been announced by Russell H. Coe, national Sales Manager of the Protective Coatings Division. Mr. Means, most recently handling sales for the S. D. Day Company, Southwest representative of Pittsburgh Protective Coatings, has been taking care of Pittsburgh Coating sales and service in the Houston area for more than a year.

Manager, Tulsa Office

FRANK E. McNULTY

Protective Coatings Division of Pittsburgh Coke & Chemical Company announces the opening of a new office at 711 Thompson Building, Tulsa, Oklahoma, to serve the Central Midwest. Frank E. McNulty, former manager of the Koppers Company's Tulsa office, has joined the Protective Coatings staff as manager of the new office.

During the war Mr. McNulty was with the C. S. Foreman Company, taking part in building the War Emergency Pipeline—both the 20-inch and 24-inch lines—in Missouri, Indiana and Ohio.

Hercules Powder Company

A revised edition of the technical booklet describing properties and uses of Hercules Powder Company's synthetic resins is now available by writing the company offices at Wilmington, Delaware.

A key to specific uses for Hercules synthetic resins is provided by a chart which matches the resins with their actual and potential uses. From this index the formulator who is faced with a resin problem can pick out the resins indicated for use in a particular field. Then, by turning to the pages where these resins are briefly described, he can study the properties of the desirable resins only and thus more quickly select the resin or resins best adapted to his needs.

Resins described in this booklet are used in the manufacture of protective coatings, adhersives, printing inks, linoleum and floor tile, binders for flameproof compositions and many other products.

Julius Hyman & Company

Julius Hyman & Company, Insecticide Manufacturer, Denver Colorado, announces the completion of its new Bioassay Laboratory. Designed to include both developmental and control work on insecticides for agricultural, household and industrial use, it is one of the most modern and well-equipped laboratories of its kind in the country. A technical staff including eight entomologists, chemists, and assistants, work under the direction of Dr. Y. P. Sun, Entomologists and Head of the Laboratory. Controlled temperature rooms and an attached greenhouse where plants are grown under artificial light, permit the growing of plants and insects for testing throughout the year. A specialized system of air-conditioning is used to prevent contamination of materials and insects under tests, and insure uniformity in both cultural and testing procedure.

Diamond Alkali Company

Funeral services were held for W. Emmett Bittner, Vice-President—purchaser for Diamond Alkali Company, Cleveland, Ohio, on September 5 at Pittsburgh, Pa. While his home was in Pittsburgh, Mr. Bittner's office had been located at Cleveland, since the company transferred its general headquarters to that city in March, 1948. His lifetime career in purchasing, spanning some 33 years, together with his keen interest in professional organizations, made Mr. Bittner one of the nation's most widely known figures in his field.

* * *

Pittsburgh Plate Glass Company

Tough, strong rubber products, both natural and synthetic, formerly obtainable only in black, may now be mmanufactured in every color of the rainbow as a result of the development of a silica pigment so fine that 300 million particles will fit on the head of an ordinary pin, according to the Columbia Chemical Division of Pittsburgh Plate Glass.

"Hi-Sil," developed in the Company's Barberton, Ohio, research laboratories, has been hailed by the rubber industry as a revolutionary development in pigmentation. It is the first silica pigment to be developed which is not a laboratory curiosity but one that can be manufactured in large quantities and at comparatively low cost.

Tested on both laboratory and factory scale for various classes of manufactured rubber goods, Hi-Sil is now available to compounders in quantity, it was stated. In addition to providing a wide color range for functional rubber goods of all types, the extremely fine-particle pigment will make possible many new types of rubber articles which were heretofore impossible to manufacture.

Claimed to be the first practical silica pigment in its field, Hi-Sil is a very absorptive pigment. Particle size is .025 Micron, measured by the electron microscope. Specific Gravity is 1.95. The pH of the pigment can be varied over a wide range, from about 2.5 to about 9.5. Hi-Sil is said to impart high tensile strength, good abrasion resistance and exceptional tear resistance to natural and synthetic rubber compounds. For use in vinyl resin compounds it imparts unique properties desirable for numerous applications.

Wyandotte Chemicals

Manager of Development

W. L. RIPPETEAU

Thomas H. Vaughn, vice president —research and development, Wyandotte Chemicals Corporation announced some months ago the appointment of W. L. Rippeteau as manager of development for the company. This announcement was inadvertently delayed.

Mr. Rippeteau joined Wyandotte Chemicals in 1947 as a contact representative for the new organic and inorganic products being produced by the company. After graduation from the University of Kansas in 1939, Mr. Rippeteau was employed by Phillips Petroleum as a research and development engineer. He served during World War II in the Production Engineering Branch of the Technical Division of the office of the Chief of Chemical Warfare Service and was separated from the service as a major.

* * *

Semple Is Wyandotte President

Robert B. Semple, formerly Director of Monsanto Chemical Company's General Development Department, is now president and director of Wyandotte Chemicals Corporation.

Holder of a Master's Degree in Chemical Engineering from MIT, Mr. Semple comes to Wyandotte from Monsanto where he had many years of research and sales experience. The new Wyandotte Chemicals Corporation President is a member of the American Chemical Society, American Institute of Chemical Engineers and the Society of the Chemical Industry.

* * *

Abbott Laboratories

Dr. Richard K. Richards, director of pharmacological research, has been appointed professor lecturer of pharmacology and therapeutics at the Northwestern University Medical School.

Chemical Research Center

One of the nation's largest and most modern industrial-research centers has been completed at South Charleston, W. Va., for Carbide and Carbon Chemicals Corporation by The H. K. Ferguson Company, industrial engineers and builders.

Situated on a 140-acre site near Carbide's South Charleston plant, the laboratories will be the center of the company's fundamental research operations in organic chemicals and resins.

The program will concentrate on the design of new chemical molecules with the goal of developing new "Flexol" plasticizers, new synthetic resins, and new organic chemicals for agriculture and other uses.

The possibility of cross-contamination between areas has been eliminated by maintaining each laboratory at a slight negative pressure with reference to offices and corridors. Another familiar problem of the ventilating engineer—the loss of conditioned air through fume exhaust doors—was solved by providing each hood with an independent supply of clean, tempered air. When a hood is placed in operation, a lever is thrown which opens the air supply ducts and doubles the speed of the exhaust fan.

* * *

Dow Chemical Company

C. Benson Branch of the plastics division of Dow Chemical has been named manager of the firm's Technical Service and Development Division by Donald Williams, director of sales.

During the war years after 1942, Mr. Branch was a production superintendent of Dow's Texas styrene plant. He also had charge of benzene recovery from petroleum by-products and of the cracking of polypropyl benzene for aviation fuels.

* * *

AFCA Sustaining Member

The Armed Forces Chemical Association announces that the Allied Chemical & Dye Corporation, New York City, has become a sustaining member of the Association after having been a group member for many years. Other sustaining members of AFCA are E. I. du Pont de Nemours & Company, Dow Chemical Company, Niagara Alkali Company and Wallace & Tiernan Products, Inc.

* * *

At National Metals Show

Representatives of the Magnesium Division of The Dow Chemical Company who will be in attendance at the National Metals Show in Cleveland, Ohio, on October 17-21 are W. S. Loose, magnesium sales manager; T. H. Caldwell, Jr., die casting sales manager; G. W. DeKuiper, wrought products sales manager; J. C. H. Stearns, ingot sales manager; H. W. Dove, foundry sales manager; C. E. Lehnhardt, fabrication sales manager; W. H. Gross, magnesium publications; and representatives from the various sales office of The Dow Chemical Company.

* * *

Dow Exhibits

The world's lightest structural metal will be featured in the six-panel "How Magnesium Pays" exhibit of Dow at the National Metals Show. Forty feet of display will depict the completed products in which magnesium plays an important and economy-effecting part. The magnesium parts that are utilized in the product will be displayed on each panel. Illustrative photographs and text above the panel will describe "How Magnesium Pays" in the construction of the article.

* * *

Just What Does Industry Say?

Group and Sustaining Members of the Armed Forces Chemical Association are enthusiastic about their membership in AFCA. Many, many nice comments are received at National Headquarters during any month of the year. For a sampling of reaction from industry we suggest you turn to page 35.

* * *

Diamond Alkali Company

Earmarked for dairymen, Diamond Alkali, one of the nation's leading manufacturers of dairy detergents, has issued a new 6-page booklet aimed to simplify and speed-up dairy farm sanitation to the interest of more effectively safeguarding product quality, purity and flavor against high bacteria counts.

* * *

American Cyanamid Company

Davis and Geck, Inc., a subsidiary corporation of the American Cyanamid Company engaged in the production of surgical sutures, announces the election of Charles P. Collins as Vice-President and his appointment as General Manager.

In his position Mr. Collins will be charged with the general management of the Company's affairs under the supervision of Benjamin F. Hirsch, who continues as Executive Vice-President. C. Carroll Adams will continue in his capacity of Vice-President devoting his principal attention to production problems.

CHEMICAL CORPS

GRADUATE SCIENTIFIC TRAINING PROGRAM

UNDER PRESENT PLANS IT IS ANTICIPATED THAT A RESERVE NUCLEUS OF FULLY-TRAINED SCIENTISTS WILL BE BUILT UP AND THAT THEY WILL BE WILLING TO REMAIN WITH THE CORPS TO DEVOTE THEIR TIME TO MILITARY RESEARCH AND DEVELOPMENT.

Commencing with the fall semester 1949, the Chemical Corps announces the inauguration of a graduate scientific training program at Army Chemical Center, Maryland. Courses will be open to young scientists now on duty at Technical Command and Medical Division, leading research organizations of the Corps. Degrees of Master of Science and Doctor of Philosophy will be offered in the physical and biological sciences with specialization in the fields of biochemistry, chemical engineering, mathematics, organic chemistry, and physiology.

Brig. Gen. E. F. Bullene, Commanding General of Army Chemical Center, in announcing establishment of the program in coordination with the University of Maryland, stated that the development of the professional maturity of young scientists and their advancement to responsible positions was "vital to the continued success of the research and development program of the Chemical Corps."

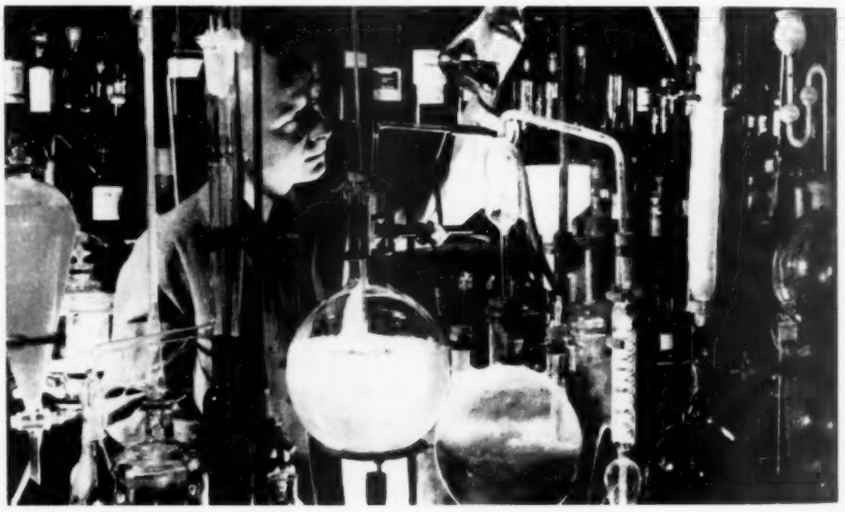
Under present plans it is anticipated that a reserve nucleus of fully trained scientists will be built up and that they will be willing to remain with the Corps to devote their time to military research and development. Heretofore, industry has often diverted some of the best scientific men to its own use through offering specialized field of research and development in addition to greater financial remuneration.

Considerable thought and planning has gone into this unique program. Originating as part of the In-Service Training program of the National Military Establishment, the First Chemical Corps Conference on Scientific Personnel was held at Army Chemical Center in October 1948. Attended by representatives of the Research and Development Group, War Department General Staff, of other interested agencies of the Department of the Army, by chiefs of various branches of the Chemical Corps, and representatives of the Civil Service Commission and of the University of Maryland, specific policies were promulgated for the implementation of the program.

Prior to its inauguration, however, fiscal problems required solution. This was largely achieved through a budget allowance for fiscal years 1949-50. It is anticipated that similar appropriations will be available in future years.

The solution of the foregoing problems now makes it possible for the Corps to offer this unique scientific educational opportunity to junior research assistants of the staffs of Technical Command and Medical Division. They may now pursue studies leading to their graduate degrees, in the field of their choice, with a minmum of financial concern. The course is not only offered to them without cost, but they may take four hours of the required eight hours per week of lectures and laboratory work during their regular duty hours. At the same time, they maintain their full civil service status. This is comparable to the finest university fellowships while offering its own unique advantages. The only fees connected with the course will be for registration, thesis binding, and graduation fees payable to the University of Maryland which is responsible for that part of the program.

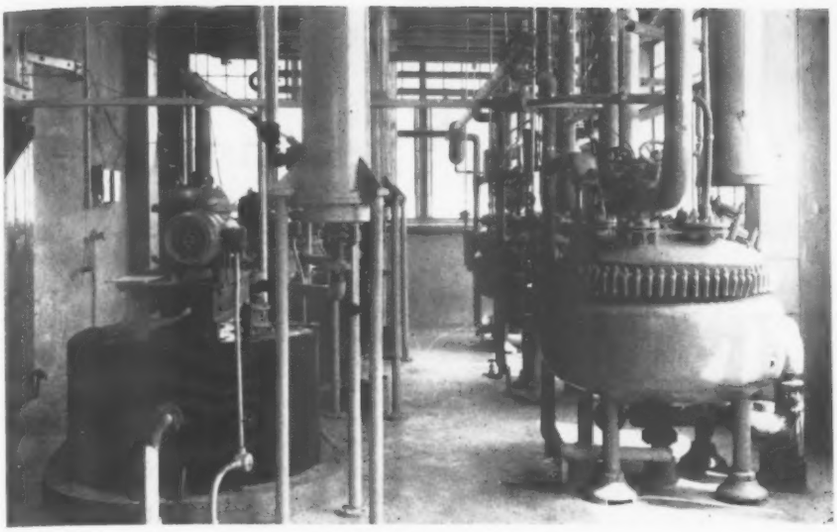
The University of Maryland, which has always fully cooperated with the National Military Establishment in promoting education of an in-service nature, will supervise and conduct the graduate level instruction under terms of a contract between the Chemical Corps and the University. H. C. Byrd, president of the university, stated that the fusion of military and scientific research will "also stimulate and enrich other graduate instruction and research in the physical and biological sciences under the university's care."



SCIENCE AT WORK
A Reserve Nucleus of Fully-Trained Scientists Will Be Built Up . . .

Dr. Duncan MacRae, Chief Technical Consultant of Technical Command, will organize, supervise, and conduct all phases of the program on behalf of the Corps. A resident supervisor of the University of Maryland will conduct all examinations, correlate instruction material with that of the university, and approve the granting of graduate degrees. It is anticipated that approximately fifty graduate degrees per year will be granted under this program.

Graduate students will find an eminent staff and the most modern laboratories at their disposal. The research facilities of the scientific and engineering laboratories of Technical Command and Medical Division represent a perfect fusion of military, industrial and academic techniques



PLANT INSTALLATION FOR MANUFACTURE OF CW AGENT
. . . represent a perfect fusion of military, industrial and academic techniques.

The professional research activities of the Army Chemical Center employ some of the most competent men of the scientific, engineering and technical world. Over fifty of these scientists have the Ph.D. or M.D. degree. More than twenty formerly taught chemistry, engineering, and medical subjects in noted universities and medical schools, many are regular contributors to the scientific literature. In addition, German scientists such as rocket experts, aero-dynamicists, and engineers, including former members of famous German research institutes, will be available for lectures. Other visiting scientists, specialists from the University of Maryland, and leading authorities in the field of military research and development, will contribute to the eminence of the teaching staff.

The Technical Library which has a host of specialized features will also be available to students. Containing not only material usually found in first-rank universities and medical libraries, it has the most complete collection of unpublished manuscripts of military and non-military research and development carried out under the auspices of the Chemical Corps. In addition, it has thousands of captured German scientific documents indicating the extent and progress of German scientific research under the Nazi regime. Many of these have been translated into English.

The Chemical Corps and the University, in sponsoring this unique program, is opening new and unlimited fields of research and development to young scientists, thus contributing to the effective maintenance of the continued scientific supremacy of the United States.

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Membership is the life blood of any organization. However, like love, to get results one has to work at it. AFCA wants to make it easy for you to help build a strong, healthy, virile Association and if you will complete the listing of names and mail to National Headquarters your quick-like-lightning staff will carry the ball. Meanwhile, if you want to pass on a favorable word to Mr. Non-member before we contact him it will be appreciated. At any rate, tell us who should be a member. We'll do the rest.

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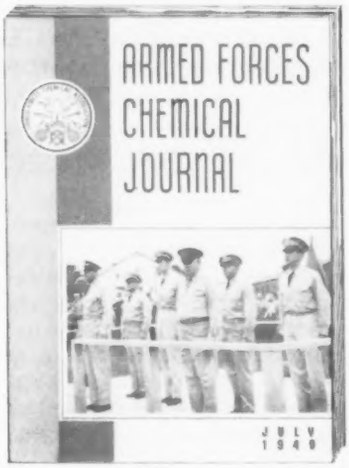

to the following

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In writing them, may we mention your name?
☐ Yes ☐ No
Many thanks to you.

UNCOVERING JAPAN'S TECHNICAL SECRETS*

"....OF CONSIDERABLE INTEREST WAS THE OBSERVATION THAT THE JAPANESE ARMY AND NAVY BOTH DELIBERATELY SPURNED THE JAPANESE SCIENTIST, WHOSE KNOWLEDGE, LABORATORIES AND RESEARCH EQUIPMENT MIGHT HAVE CONTRIBUTED SO MUCH TOWARD A MORE SUCCESSFUL PROSECUTION OF THE WAR...."

By
Capt. Winthrop Slocum, USNR (Ret.)

It may surprise some readers to learn that the United States Navy sent a group of missionaries to Japan immediately after that nation admitted its fall from divine favor in the summer of 1946. These persons, however, were not of the Chaplain Corps dispatched to propagate religion in Nippon. They were a group of officers and civilian engineers and experts, members of the US Naval Technical Mission to Japan. Our Navy wanted to determine the position of the Japanese in the field of naval technology. The fighting war had been won—what scientific lessons could we learn from our erstwhile enemy?

To obtain the desired information, it was essential that investigators enter Japan with the Occupation Forces, before manufacturing plants, equipment, materials, and records could be destroyed and experienced personnel dispersed.

Mission Established

The U. S. Naval Technical Mission to Japan, better known as NavTechJap, was established on 14 August 1945 by an order of the Commander in Chief and Chief of Naval Operations. The purpose of the mission was to survey all Japanese scientific and technological developments of interest to the Navy and Marine Corps in the Japanese Islands of Hokkaido, Honshu, Shikoku, and Kyushu; in China; and in Korea south of latitude 38 degrees N. This involved the seizure of intelligence material, its examination and study, the interrogation of personnel, and, finally, the preparation of reports which would appraise the technological status of the Japanese Navy and Japanese industry.

The surrender of the Japanese in mid August served as a jet-assisted take-off for the Naval Technical Mission which sailed from Pearl Harbor on 1 September. It was part of the convoy that entered Sasebo Naval Harbor on 23 September 1945, in the initial occupation of Kyushu. Within 3 weeks, technical intelligence teams stemming from Sasebo had entered Tokyo, Yokahoma, Yokosuka, Kure, Hiroshima, Osaka, Nagasaki, Shimonoseki, and many other cities with, or shortly after, the initial landing of the Army or Marine units in those places.

Before the cessation of hostilities, the Office of Naval Intelligence had ready a publication, "Intelligence Targets—Japan." This was a series of pamphlets stating the Navy Department's requirements for intelligence exploitation in Japan, and represented the coordinated demands of the Chief of Naval Operations, the several material Bureaus, the Office of Research and Inventions, the Naval Research Laboratory, and other technical activities. The targets contained therein emphasized naval interest entirely. Nevertheless, they had also been coordinated with the War Department Intelligence Collection Committee in those cases where War Department interests paralleled those of the Navy.

There were other intelligence units operating in the Empire, too, such as the Compton-Moreland Scientific Survey, the US Strategic Bombing Survey ("Usbus"), the Air Technical Intelligence Group ("Atig"), and the Military Intelligence Section of SCAP. The function of NavTechJap had to be correlated with the activities of these other groups in order that all intelligence units could profit from the disclosures obtained by each.

Intelligence Objectives

What sort of things were the Navy Bureaus interested in? What was the nature of some of these individual targets? First, of course, were such items of general intelligence as Japanese naval war plans, war diaries, and battle reports; budget estimates and annual construction figures; codes and ciphers; hydrographic and meteorological information; personnel figures and training programs.

The Bureau of Ships was naturally interested in the characteristics of Japanese naval vessels in service and under construction; submarines; mine detectors; electrical equipment; and ordinary things like ship's-bottom paints.

The Bureau of Ordnance wanted information about torpedoes and their aerial counterpart, guided missiles; mines and depth charges; rockets, bombs, ammunition, armor, and the big naval guns.

The Bureau of Aeronautics, of course, inquired about new designs of aircraft, new types of engines; progress in jet propulsion and in propeller research; deicing equipment; parachutes; photographic equipment.

The Bureau of Medicine and Surgery was especially interested in data relative to life in the jungle and on sea islands, particularly that apropos diet, malaria control, and insect repellents; infection of Naval personnel with tuberculosis (in view of Japan's high TB rate); neuropsychiatry and rehabilitation. A special target of considerable interest at the time involved the medical effects of atomic bombing.

Electronics targets were set up separately, in view of the importance of this equipment in modern naval warfare. Information was desired about all kinds of radar and radar countermeasures; direction finders and navigational aids; electron tubes, antennas, and many other subjects, all very technical.

Only a few of the engineering and medical members of NavTechJap could speak Japanese. To undertake investigations in a foreign country without knowledge of the language would be like trying to scale a high wall without a ladder or rope. But the Navy had foreseen this problem, and language officers were made available as interpreters. Many of them had been teachers of language in high schools and colleges before their commissioning in the naval reserve. They had been given 6 months to a year of very intensive training

*A condensation of the original article published in The Military Review, publication of The Command & General Staff College, Fort Leavenworth, Kansas.

in Japanese. This is an extremely difficult language, and their instruction, of course, had to cover not only social conversation but technical terms used in nautical practice, in electrical engineering, chemistry, metallurgy, and so on. Fortunately, engineering drawing and blue prints speak a universal language, and when these were available, as was often the case, the discussions proceeded under a full head of steam.

In many instances, it was necessary for the Navy technician to do considerably more than simply to investigate the material on hand. For example, a new model, 20-cylinder diesel engine was about 50 percent completed when Japan surrendered and all construction and development of war equipment stopped. The engine showed promising possibilities. The originating Japanese engineers and scientists were located and brought back to complete its construction, at the expense of the Japanese government. Upon completion, tests were run under NavTechJap supervision, to determine its performance.

NavTechJap investigators, unarmed and often alone, visited scores of places in Japan, both urban and rural, and never once were molested or threatened. Usually, the American was ignored, little curiosity being displayed by Japanese adults. When the Japanese were asked for information, friendliness and willing cooperation were the general rule.

Of considerable interest was the observation that the Japanese Army and Navy both deliberately spurned the Japanese scientist, whose knowledge, laboratories, and research equipment might have contributed so much toward a more successful prosecution of the war by the Japanese. The scientist recognized this and felt deeply injured over the lack of confidence in his ability and his loyalty. Little organized research was carried on during the war outside of the Army and Navy. A corollary to this is the fact that by such policy Japan failed, in general, to realize these tremendous and permanent scientific advances that a modern nation gains from huge wartime expenditures for research.

The common concept that the Japanese lack originality and are merely an imitative people is in need of qualification. They entered the fields of science and mechanical industry only a comparatively few years ago. The sensible thing was to engage in wholesale copying until they caught up with other countries. Had they proceeded independently in scientific research and discovery, they would always have been 50 years behind. The Japanese may be especially adept at copying, but evidence of their originality and ingenuity is not lacking.

Lack of Axis Coordination

The Japanese received very little effective help from the Germans or the Italians. It is true that many Japanese submarines were equipped with the Schnorkel, but it is understood that the Japanese saw a German submarine in Hong Kong and copied the Schnorkel features. A Japanese submarine crew was sent to Germany for training, but all hands were lost on the trip back. Some assistance was received from Germany pertaining to Electronics, but Japan was still well behind us in the design of this equipment. Such information as the Japanese obtained was largely of a general rather, than a specific nature. The single important exception seems to have been the assistance given by Germany in the sonar field. Some of the Japanese equipment was almost an exact copy of captured British equipment.

Paper Balloons

Most readers will recall the Japanese Army's effort to use paper balloons as weapons of war. Some 8,000 to 9,000 balloons were launched in 1944, each carrying a load consisting generally of a 15 kilogram high explosive bomb and 4 or 5 kilograms of incendiary bombs.

It was estimated that 10 percent of the balloons released would be carried by air currents to the American mainland and would start forest fires or cause other damage. The project was conceived principally to boost home morale and also to serve as a psychological warfare threat against the United States. It was discontinued because of negligible results, the advent of unfavorable weather, and a shortage of hydrogen gas. An investigation was undertaken by the Mission to learn if this project bore any relationship to plans for bacteriological warfare. Extensive research was known to have been carried on by the Japanese Army Bacteriological Warfare Section, but no connection could be established linking it with the trans-Pacific paper balloon project.

Use of Ocean Currents

Loss of much of her shipping capacity and the resulting fuel and food shortage caused Japan to give consideration to suggestions by her oceanographers that ocean currents be utilized for transportation of necessities. Since 90 percent of the drift bottles set adrift in the Japanese Sea off the east coast of Korea reached the northern part of Honshu, it seemed feasible to use the *Kuroshio* (Japan Current) for the transportation to Japan proper of soya beans from Manchuria, and other goods from Formosa, Nansei Shoto, and other places. A small wooden ship of 200 tons was successfully floated from Fusan to Honshu. Then plans were made for floating metal drums which would drift below the surface; some in every lot would be equipped with radios and at intervals they

FLAMETHROWER ENROUTE TO TOKYO

BuMed was interested in data relative to life in the jungle.

INTERVIEWING CAPTURED NAZI BRASS
The Japanese received very little effective help from the Germans.

would rise and be contacted by land stations in order that their movements could be traced. Loss of the Philippines, meantime, prevented carrying out the plan.

Japan was far behind us in the field of electronics, but her experiments with a "Death Ray" may have the unique outcome of saving countless lives threatened by tuberculosis. These experiments showed a pronounced effect on the lungs of the animals tested, and further research was contemplated toward a possible cure for tuberculosis. It was noticed that higher frequencies affected the brain. The investigators realized that heat was an evident factor, but they were sure that frequency was important also. The frequency characteristic could be associated with the resonance dimensions of the head and body respectively. It is quite possible that Japanese or American investigators may develop treatment for tuberculosis and for certain brain disorders that will have great therapeutic value. A mass chest X-ray program for the diagnosis of tuberculosis was interrupted by the war, but Japan was using an "immunization" technique that should be further investigated.

Night Blindness

Japanese medical officers observed that most cases of night blindness occurred with pilots having liver trouble and whose secretion of the bile was not normal. Acting on this hint, they developed a preparation named *Migozai*, whose ingredients stimulate the secretion of the bile and the absorption of Vitamin A, so necessary for the retina of the eye. The vision of the dark-adapted eye, when taking this preparation, improved from 1½ to 2 times. This means that, looking at the same object, the eye can see it from twice the distance.

More notable, and certainly more far reaching, is the discovery of two drugs by Japanese who were searching for some therapeutic agent resembling chlorophyll, with its power of converting sunlight into energy. These were derived from neocyaine and named *Koha* and *Shiko* (meaning Rainbow Wave and Violet Light). The drugs improve general body resistance and stimulate regeneration of tissue. The Japanese have demonstrated remarkable results with these when used in leprosy cases. Burns and frostbite responded with gratifying acceleration, while benzine burns and boiling water burns, especially, showed quick improvement.

Japan has long been noted as the most active earthquake land area in the world. No other country remotely approaches her average of 4,000 per year. Japanese scientists have made contributions of great importance in the field of seismology. Building laws governing wood and concrete construction have been strongly influenced by their researches and recommendations. NavTechJap investigators discovered that several large steel-frame hangars at the Yokosuka air field were of very unusual construction. This novel design was called the "Diamond Truss," from the diamond-shaped pattern formed by the intersecting arches. The skewed arches form the longitudinal bracing of the structure in addition to taking the regular loading. Admirably constructed to withstand earthquake shock, this design also resulted in a tremendous saving of steel—a major wartime objective. It should receive the consideration of American architects and contractors for any structure where large roofing areas are involved, such as hangars, garages, factory and mill buildings, armories, and gymnasia.

Supply Shortages

The Japanese, in spite of considerable stock-piling, soon encountered serious shortages in basic materials. The principal metallic shortage was nickel. Molybodenum was used in conserving nickel, until it, too, became scarce. Tungsten, although relatively plentiful at the beginning of the war, in time became a critical material. Some very interesting research was undertaken in the field of high temperature alloys for gas turbines and rockets, because of the scarcity of nickel and cobalt. Inferior iron-chromium alloys had to be substituted in the field of resistance wires in place of the conventional nichrome types. Their copper was of high quality but of such short supply that high-grade conductors were used only for the most pressing applications, such as aircraft.

Petroleum was the "Achilles heel" in the Japanese armor, and her lack of this precious fuel was the fundamental cause of her downfall. When the Japanese superbattleship *Yamato* made her suicidal sortie southwest of Kyushu in the waning months of the war, she was powered by edible refined soya bean oil. US Navy planes sank the soya bean-burning warship 7 April 1945, when she was intercepted enroute to attack American shipping at Okinawa.

Lack of oil resources kept scores of Nipponese ships lying immobile in Kure and other ports. Many of her battleships and cruisers were sitting-duck targets, easily sunk by bombs

(Continued on Page 40)

ASSOCIATION COMMENT

AFCA's Directory

We have just received our copy of and wish to promptly commend you and your staff on the preparation, splendid appearance and complete subject matter of the current Association Directory, Constitution and By-Laws.

It would appear to contain everything that could be desired by members of the Association, will prove of value to members in many ways, and is a real credit to the Association.

V. R. Jacobs
Manager, Gov't Sales Dept.
The Goodyear Tire & Rubber Co.

* * *

The Journal

Apropos of the Journal. Although I receive four or five military publications every month I can say in all sincerity that the Journal tops the list among all of these in my estimation. As a matter of fact every copy of the Journal is carefully filed away after one reading and often taken out again in a few days for another perusal of its interesting articles.

John Tweeddale
Torrance, Calif.

* * *

The information contained in the Journal is very interesting and has great value to the undersigned as Chemical Officer of this Division.

Frank A. Palacky
1st Lt., Cml C.
Hq., 24th Infantry Div.
APO 24, c/o PM San Francisco

* * *

AFCA's Plaque

The beautiful engraved plaque which you have presented to Rowe Manufacturing Company is one of the nicest recognizances we have yet had.

We again wish to thank you for your very kind consideration, and be assured of our cooperation at all times.

Christian Gabrielsen
Vice President
Rowe Manufacturing Co., Inc.
Whippany, N. J.

* * *

. . . We are proud of our membership in the Association and for this tangible evidence of it.

J. W. Colgan
Sales Manager
Handy & Harman
New York City

* * *

. . . We wish to express our thanks for the recognition extended this Corporation by the Executive Officers of your Association and for the engraved plaque.

We wish to assure you that we will continue to support and cooperate with your Association in the future.

Alex P. Smith
Vice President
The Guiberson Corporation

The very nice plaque indicating our group membership in the Armed Forces Chemical Association has just been received. We have placed this in the lobby and it looks quite attractive. We appreciate your sending this and the thought behind it.

We are happy to support the Association in this manner of group membership, and on behalf of our company I am extending our thanks to you for this plaque.

Thomas Carroll
Vice President
The Vulcan Copper & Supply Co.
Cincinnati, Ohio

* * *

About AFCA

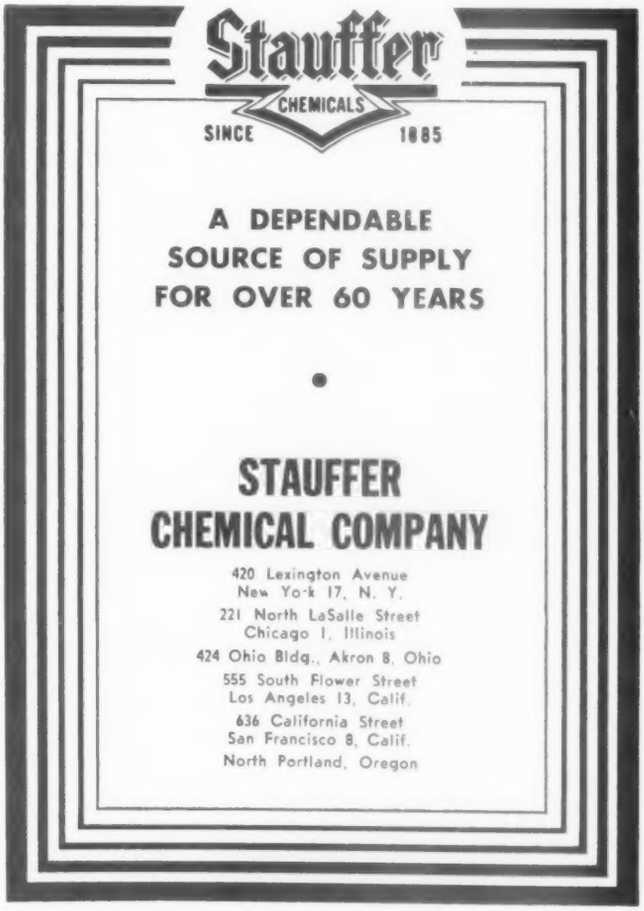
. . . We hope and believe that our association will, as time goes along, prove beneficial to both parties.

William S. Richardson
President
B. F. Goodrich Chemical Co.
Cleveland, Ohio

* * *

. . . You can always be sure that we will continue to stand behind the Association and that we will be ever ready to receive your call for help whenever it is needed.

Richard H. Turk
President
Pemco Corporation
Baltimore, Md.



MISCELLANY

Incendiary bombs drooped on Germany totaled 28,418,748 and on Japan 19,113,163, equivalent to a combined weight exceeding 227,000 tons. Total fire bombs dropped amounted to 36,918 or 13,724 tons.

* * *

The production of gas masks of all types in the United States during World War II exceeded 35,500,000.

* * *

Almost two billion dollars was expended for chemical warfare materiel in the last war. The largest expenditure was for bombs, the next largest was for protective materiel, with chemical ammunition a close third.

* * *

CWS officers who saw service all over the world during the last war have been heard to remark that everywhere they went they found tubes of protective ointment. This is easily understood when it is realized that more than 55,000,000 tubes of this ointment were produced and a large part of this vast quantity was shipped overseas.

* * *

During the first year of operations in the Mediterranean Theater four chemical mortar battalions fired approximately a half million rounds of ammunition.

* * *

The 4.2-in. mortars of the 87th Chemical Mortar Battalion were among the first guns in action on Utah Beach on D-Day. The 87th was in support of the VII Corps in the attack on the port of Cherbourg.

The 86th and 92nd Chemical Mortar Battalions landed in France in July 1944.

* * *

Almost two and a half-million rounds of 4.2-in. shell were fired in the European and Mediterranean Theaters.

* * *

The First Gas Regiment was created by War Department General Order 108, dated August 15, 1917. The order prescribed, "Under authority conferred by Section 2 of the Act of Congress 'authorizing the President to increase temporarily the Military Establishment of the United States,' approved May 18, 1917, the President directs that there be organized for the period of the existing emergency, the enlisted strength to be raised by voluntary enlistment or draft, the following special and technical engineer troops: A. For each army: (1) A Gas and Flame Service (one regiment)."

* * *

Flashback to World War I. The Distinguished Service Cross was awarded to Sergeant Harry Melvin Woods, Company D, First Gas Regiment. The citation reads as follows: For extraordinary heroism in action near Montfaucon, France, 29 September, 1918. While this position was under heavy and continuous bombardment of both gas and high explosive shells, Sergeant Woods voluntarily left his dugout and put gas masks on nine wounded soldiers, giving his own mask to one of them, and thus saving their lives. After being severely gassed by the explosion of a shell, one piece of which struck him, he continue to administer aid to the other wounded, and quit only when his eyes were swollen shut and he was completely exhausted.

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Congress Approves

New Pay For Armed Forces

Legislation raising the pay of the armed forces was approved in late September and most servicemen will get their first higher pay check at the end of this month with it being retroactive to October 1.

Final action came sooner than anticipated. Members of the House Armed Services Committee got together and decided to recommend acceptance of the Senate version of the bill without sending it to a joint conference committee for adjustment of differences, as is normal.

The House went along, after Representative Paul Kilday (D., Tex.) author of the bill, said the Senate changes were so minor there were no differences worth sending to conference. On the final voice vote only Representative Clare Hoffman (R., Mich.) asked to be recorded in opposition.

Two of the Senate amendments, however, carry substantial benefits to the groups affected.

One gives all generals and admirals $50 more a month in base pay than was voted originally by the House. Those of the top brass drawing extra compensation for flying, however, will not benefit, for the boost is offset by a cut from $210 to $150 per month in generals and admirals' flight pay.

The other amendment gives reservists retired for physical disability the same hospital, commissary and post exchange benefits as retired regulars. Thousands of retired wartime officers of the Army and Air Force may now apply to Army and Navy hospitals for treatment instead of to the Veterans Administration—a privilege already enjoyed by Navy reservists retired for disability.

Another Senate amendment accepted in the final version puts warrant officer promotions and pay increases on a basis of longevity instead of selection. It will mean additional pay boosts for many veteran warrant officers.

Senior major generals and above will get an increase of $251 a month for a total of $1,146 monthly in the final version. Senior brigadier generals will receive $306.50 more each pay day, or $1,018 per month.

Colonels get a boost of $138—to $831—and second lieutenants $48 more, or $330 monthly in all. Corporals with seven years in uniform get a $97 increase, to $238 monthly. Sergeants get raises of from $72 to $89 a month.

The wartime system of family allowances, whereby men of low rank with many children drew more than some top-ranking noncoms will be gradually eliminated. Other special pay and allowances will be cut or dropped.

Rank	Years Service	Old Pay	New Pay
Major General	32	$895	$1,146
Major General	27	895	1,118
Brigadier General	30	712	1,018
Brigadier General	25	712	961
Colonel	27	693	831
Colonel	23	657	803
Lieutenant Colonel	22	616	717
Lieutenant Colonel	17	584	660
Major	16	511	603
Major	11	484	506
Captain	10	396	502
Captain	7	385	474
First Lieutenant	5	327	402
First Lieutenant	3	327	388
Second Lieutenant	2	282	345
Second Lieutenant	1	282	330

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Methanol — synthetic
Methanol — from wood distillation
Ethanol — industrial grades from molasses and grain
Ethanol — from sulphite waste liquor
Ethanol — anhydrous, Vulcan process
Ethyl alcohol — beverage, neutral spirits, beer
Isopropanol
Allyl alcohol
Butanol

ESTERS
Methyl acetate
Ethyl acetate
Isopropyl acetate
Butyl acetate
Vinyl acetate
Dibutyl phthalate
Methyl methacrylate

ALDEHYDES
Acetaldehyde
Butyraldehyde
Furfural

ETHERS
Ethyl ether
Isopropyl ether

DDT

KETONES
Acetone
Methyl ethyl ketone

GLYCOLS
Ethylene glycol
Butylene glycol

CHLORINATED HYDROCARBONS
Chloroethane
Chlorobenzenes
Chlorotoluenes
Trichlorethylene

HYDROCARBONS
Butadiene
Heptane
Benzene
Toluene
Styrene
Diphenyl
Hexane
Alkyl Benezenes

ACIDS
Formic acid
Acetic acid — from wood distillation
Acetic acid— from process residues and solvent recovery
Acetic anhydride
Propionic acid
Butyric acid
Stearic acid
Monochloracetic acid
Salicylic acid
Fatty acids

PHENOLS
Phenol
Naphthol

MISCELLANEOUS
Citronellal
Geraniol
Essential oils
Aniline
Monethylaniline
Diethylaniline
Oxygen
Hydrogen
Arsenic trichloride
Waste sulphite liquor

Vulcan distillation evaporation extraction processes and equipment

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THE "DECONS" AND THE AIR LIFT

(Continued from Page 16)

equipment be tried before attempting to develop anything new. A "decon" truck was obtained and put to anything new. A "decon" truck was obtained and put to the test. Its standard equipment proved to be highly satisfactory. The high pressure pump and "mist" spray nozzles were found to be ideal for applying a thin film of isoprophyl alcohol over the frost covered control surfaces. The extreme mobility of the unit made it possible, even on short notice, to service aircraft anywhere on the field within a matter of a few minutes.

Although the "decon" apparatus is rather simple in nature, its maintenance and operation in the hands of inexperienced personnel presented problems in freezing weather as with most other equipment handling liquids. In order to eliminate as many of these problems as practicable, a course of instruction was established in Wiesbaden at the Air Chemical Center, Headquarters, U.S. Air Forces, for training Air Force personnel in the operation and maintenance of this equipment. Once this program was put into operation nearly all maintenance and operational difficulties were eliminated.

After the first unit proved its ability to perform the required task a hurried call was sent out for more of them. Several were soon located where they were being used as auxiliary fire fighting apparatus at nearby Army and Air Force stations. These were immediately pressed into service, and others were located in the European Command by the Chemical Division, EUCOM. All available vehicles in the theater were used and if more had been available they would have been most welcome. The Chemical Corps Depot shops at Hanau reconditioned and put the units into operating condition, and Air Force Life personnel operated them.

One question that arose in the minds of the Airmen during the use of isoprophyl alcohol was that of its possible effect on the deicer boots and other exposed flight operational equipment. After prolonged use of this material, no harmful action on any part of the aircraft could be detected. However, all planes serviced were metalic covered except for the deicer boots and it is conceivable that some of the various dopes or paints used on fabric covered portions of aircraft might be affected.

As many motorists know, glycerin applied to windshields in freezing weather will eliminate frosting for prolonged periods. This effect was found to be also applicable to frosting aircraft surfaces. When testing a solution of equal parts of isoprophyl alcohol and glycerin, acceptable protection for approximately six (6) hours was obtained. Although isoprophyl alcohol gave effective protection for only approximately two (2) hours, this was considered satisfactory for the conditions under which the aircraft operated.

So effective and rapid was this method of defrosting, that a C-54 or its civilian equivalent, the DC 4 or 6, could be completely cleared of frost in one slow pass (of about 4 to 6 minutes duration) around the parked plane by the "decon" truck. The overall effect of this development on the "Air Lift" as reported by Air Force personnel, at the great Air Lift Airport of Rhein-Main, was that not an hour of flying time was lost, due to ground frosting, during the winter months.

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UNCOVERING JAPAN'S TECHNICAL SECRETS

(Continued from Page 34)

and torpedoes dropped by our airmen.

The Mission's search for data and equipment on Japanese petroleum research seemed hopeless, until the remains of a laboratory were discovered at Ofuna. Most of the documents and data were said to have been destroyed, but enough remained to indicate that a sizeable establishment was once in operation there. Again, the Japanese engineers, draftsmen, scientists, and research men formerly employed in the laboratory were assembled to duplicate plans, drawings, and experimental data which had been developed. Strangely enough, the Japanese scientists took considerable pride in accomplishing this work to demonstrate the extent of their advancement. The net result was a complete disclosure of Japan's petroleum research.

Japan's efforts to find substitute fuels were frantic, and to a limited extent effective, but entirely inadequate. Until the beginning of the war, the Japanese Navy's chief source of diesel and bunker fuel was imports from California. This stock pile was exhausted in 1942 and cracked residues from Sumatra and Borneo crudes were then utilized as bunker fuels. In 1944, due to Japanese tanker losses to US submarines, research and practical testing were undertaken on both diesel and boiler fuels to develop substitutes. By the spring of 1945, aircraft carriers were utilized as tankers to bring motor gasoline from Singapore to be used as charging stock in the manufacture of even more desperately needed aviation fuel.

Satisfactory diesel fuels were produced from coconut oil, hydro cracked; pressed copra oil; esterified copra oil; and soya bean oil. Pine root oil was used, too, but it had a tendency to leave gummy deposits in the engine. A determined effort was made to develop an industry for converting coal into oil, but the results were comparatively insignificant. As a matter of fact, the outputs of oil from shale at Fushan, until 1944, exceeded the combined output from all coal conversion processes.

During the last year of the war, the Japanese had considerable success with a program for producing alcohol and using alcoholic aviation fuels. For instance, they were able to produce 1 pound of ethyl alcohol from the fermentation of 11 pounds of sweet potatoes. This, in turn, necessitated vital decisions about which varieties of potatoes were best for food and which best for fuel, and how the two should be apportioned to keep the nation alive to fight.

By the spring of 1944, the supply of cane sugar and molasses from Formose, Java, and the Philippines was decreasing, and more emphasis was placed on Manchurian grain as a raw material source of ethyl alcohol. Finally, butanol plants were converted to the production of ethyl alcohol. Thus were the Oriental and Occidental opposed in mortal—and technological—combat: the Japanese converting his rubber into gasoline and the American converting his gasoline into rubber.

Such were some of the highlights reported by the Mission.

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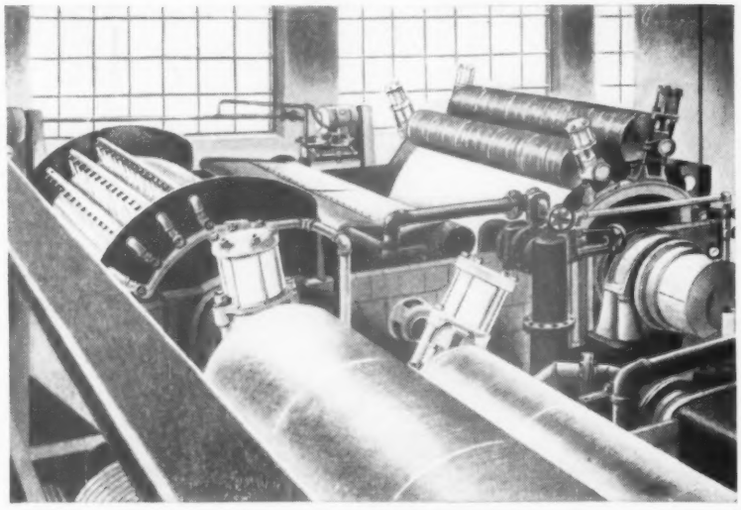

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